This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

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Industrial Medical and Hygiene Problems

—Of the Munitions Industry—

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WHEN our country entered the war, the majority of plants that were engaged in war work were quickly expanded in order to meet the demands of the armed forces. This sudden expansion of war industry coupled with the needs of the armed forces created such a manpower problem that it became necessary to employ not only unskilled and inexperienced workers but also those who, because of physical defects, would not have been accepted by industry in certain jobs under normal conditions.

In addition to personnel problems, the great demand for a maximum production of war material in the shortest period of time brought about changes in processes, the introduction of new chemicals and the employment of hastily trained supervision.

As in other industry, the industrial medical and hygiene program had to be modified in accordance with existing conditions.

The following plan was made effective in the early part of 1942:

1. Thorough pre-placement examinations for all new employees.
2. Periodic physical examinations.
3. Periodic survey of all operations for the purpose of detecting exposure jobs.
4. Analysis of new jobs and chemicals from a toxicity point of view.
5. Application of control measures.

The pre-placement examination, which is primarily for the purpose of occupational selection rather than elimination, consists of a thorough physical examination including x-ray of the chest, serological test for syphilis, urinalysis, and blood counts.

Individuals who give a history of liver or gallbladder pathology, renal disease or other organic disease, or who show evidence of anemia, syphilis, tuberculosis or cardiovascular disease are not assigned to any jobs that involve exposure to toxic vapors, gases, fumes, chemicals or explosives such as TNT or DNT. Individuals who give a history or evidence of allergy or chronic skin disease are not placed in jobs involving dust or skin irritants.

To assist the personnel department in placing new employees in jobs for which they are physically qualified, and to help the manufacturing departments in transferring employees from one job to another, the medical department classified all personnel as follows:

Class A—Capable of doing any job.

Class B—Capable of doing light work only.

Class C1—Because of allergy, not permitted to work in areas where certain compounds are handled.

Class C2—Not permitted to handle TNT, DNT, and nitroglycerine.

Class C3—Not permitted to handle certain chemicals.

Class D—Not permitted to work where there is exposure to dust, fumes, or vapors.

Class E—Advise not employing this applicant on basis of findings of physical examination this date.

Periodic examinations, similar in scope to the pre-placement examinations, are given to employees annually in order to detect insidious diseases and to ascertain the physical ability of workers to do "exposure" jobs. Those employees who are found to be suffering from certain organic diseases are either removed from the job until they have recovered or are shifted to other jobs which they can do with efficiency and safety and without discomfort to themselves.

Employees who are exposed to such chemicals as TNT, DNT, nitroglycerine, lead compounds, and others are given special examinations, the type and frequency of the examination depending upon the type and the degree of exposure. In passing, it must be mentioned that two years of examinations of many workers who are exposed to tetryl, lead azide, and fulminate of mercury failed to demonstrate any evidence of constitutional effects from these compounds. Tetryl, as we will point out later, does cause skin irritation in many workers, and still remains a problem for the industrial physician and the industrial hygienist.

In addition to the inspections of the industrial medical officer and the industrial hygiene engineer of the service command, the plant is surveyed periodically by well qualified personnel of the army industrial hygiene laboratory. These surveys are complete, and include dust counts, gas analysis, illumination tests, and other qualitative and quantitative tests for evidence and degree of exposure to toxic chemicals.

Every three months, and more frequently when necessary, an inspection of all operations is made by the plant industrial medical officer and the safety engi-

neer who are both trained in industrial hygiene. All known exposure jobs are reviewed and new ones evaluated, each job being carefully studied for the purpose of either decreasing or eliminating exposure to hazardous material. In conducting these inspections the following factors are considered:

A. *Supervision:*

Gives information and guidance concerning the description of each process, the job, and the chemicals and materials involved.

B. *Operational Buildings:*

General floor arrangement, ventilation, illumination, housekeeping, and wash facilities are considered.

C. *Number of Operators:*

Spacing and arrangement of work benches.

D. *Type of Materials:*

Toxicity, method of handling, and the degree of exposure.

E. *Type of Job:*

Manufacturing, testing, packing, or transporting.

F. *Existing Preventive Measures and their Adequacy.*

When a survey or inspection is completed, a report is submitted to management for distribution to supervision and all departments concerned for guidance. This report aids the medical department in classifying and treating employees, helps the safety department in enforcing safety and health rules, guides the personnel department in placing individuals in jobs, and points out to supervision the jobs which should be modified for health or safety reasons.

With the view of maintaining the health and safety of the plant personnel at the highest level, the department heads have been given the responsibility of furnishing the medical and safety departments with information concerning any new projected operations or changes in the present process, in order that the toxicity of the materials may be determined, the selected manufacturing buildings inspected, and safety measures established for the protection of the individual workers before the process is started.

THE application of control measures can be described best by discussing a few of the common problems of this industry.

Several months ago it was reported through the plant dispensary and first-aid stations that an appreciable number of employees was not only under medical care but also losing time from work because of a condition which consisted, in most cases, of dermatitis of the face or neck or both and a swelling of the face in the region of the eye lids. In some cases the irritation was severe enough not only to close the eyelids but also distort the facial features temporarily (see Fig. 1). All the workers involved were found to be either directly or indirectly exposed to tetryl or trinitrophenylmethylnitramine which, according to Schwartz, is probably the most frequent cutaneous hazard accompanying the manufacture of munitions. Although tetryl has no odor, it is "felt" in the nose, giving a "sharp" sensation, and has a tendency to irritate the nose of new workers. In from one to three days the hands of some workers become stained from a light yellow to a red brown color; the intensity of the staining in many cases is inversely proportional to the personal hygiene of the worker. No systemic effects from tetryl were noticed.

Fig. 1

The jobs and work environment of the affected workers mentioned above were thoroughly investigated, with the following results:

Two severe cases were found in the tetryl manufacturing area. One worker was engaged in screening tetryl and came in actual contact with tetryl dust. Investigation revealed that, although the process was dusty, this employee was not over-zealous in personal hygiene. The other employee was a guard who did not handle tetryl but was required to patrol the area by walking near buildings where tetryl was processed and stored (see Fig. 2). The former case was diagnosed as contact dermatitis; after his condition was treated, he was returned to his job with instruction to observe the rules of personal hygiene. The screening operation was modified so that less dust occurred, and to date this employee and his co-workers have had no difficulty. The latter case was diagnosed as allergy and, because of several recurrences and extreme sensitivity to tetryl, he was permitted to leave the plant.

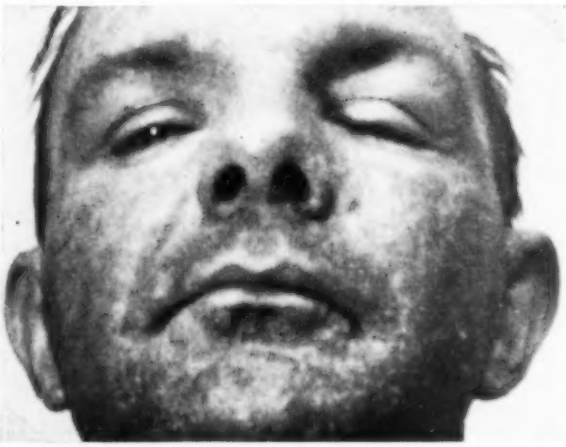

Fig. 2

Most of the cases were traced to the loading areas where tetryl is loaded into various components. Since this work involves the handling of an appreciable amount of powder and pellets by a large number of people, it is easily seen that contact could easily occur through spillage, poor housekeeping, and lack of personal hygiene. Our studies of this area revealed that a very small percentage of the cases of skin irritation was caused by allergy and by faulty technique of operations. The majority of cases was caused by carelessness and lack of personal hygiene.

In reviewing the faulty operations, we found that the handling of tetryl pellets with the bare hands, and the lack of means of removing dust from the work-benches and components were factors in the production of dermal sensitization. After management provided adequate suction and exhaust ventilation at the work-benches, and gloves and forceps for the handling of pellets, the incidence of dermatitis was appreciably reduced. Allergic operators, when found, were transferred to other jobs.

Carelessness and lack of personal cleanliness proved to be the causative factors in the largest number of cases of skin irritation and other complaints. Many

Fig. 3

cases of dermatitis of the face occurred in individuals who rubbed their eyes and face with contaminated hands (see Fig. 3). Several women were found to have handkerchiefs in handbags which they frequently used while on the job. Many employees neglected to wash their hands and face before leaving their workroom at the end of the day, and wore the same clothes at home that they had worn during their work-day exposure. This negligence, on their part, increased their exposure from an eight-hour shift to a 24-hour day.

In several cases it was noticed that the janitors who cleaned the operational buildings and workbenches were not only exposed to toxic chemicals and solvents but also did not observe the same precautions that are prescribed for the employees of the buildings. Change house attendants in "exposure" areas not only handled soiled uniforms contaminated with tetryl, TNT, and DNT, but also were exposed to the dust of these chemicals which is carried into the change houses on the shoes and clothes of operators. Several janitors developed dermatitis which necessitated treatment and in one case required some time loss from work. One attendant became so sensitized that it was necessary to transfer him to another area.

Simple but effective control methods were used in combating our problems. Whenever possible jobs were modified in order to minimize or eliminate manual contact with the chemicals. Dust exposure was controlled at the work-benches by the application of suction and local exhaust systems. Employees were advised not to bring handkerchiefs into the workrooms, and, to aid the workers in their compliance with this request, cleansing tissue was provided in exposure areas. Wash and shower facilities were provided in all areas and employees were instructed, through bulletins and demonstrations, in the proper technique of personal hygiene. All change houses and work areas have been equipped with an indicator soap which will give a red color as long as there is tetryl on the skin. A yellowish brown color develops if trinitrotoluene is present. "Exposure" workers have been supplied with uniforms and protective clothing, which are changed regularly and laundered at the plant laundry. The floors of many work buildings and change houses, particularly where a dust problem exists, have been coated with a non-skid traffic wax so that dry mopping may be easily accomplished without raising dust. An educational program is now in process to acquaint the employee with the principles of personal cleanliness and the hazards of the chemical he handles. Supervisory personnel, meanwhile, are receiving a short course in elementary industrial hygiene, so that there will be better understanding and closer cooperation whenever problems arise.

In conclusion it is believed that thorough plant surveys and inspections that are reinforced by well planned medical supervision and an adequate industrial hygiene and safety program will result in a better working environment and consequently contented and healthier workers.

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The Role of Industrial Hygiene

—In Labor Relations—

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THE tremendous expansion of the organized labor movement in the past decade is, of course, a matter of common knowledge. In terms of newspaper space, labor organizations have recently outstripped every other topic except the war. Less well known, perhaps, than the discussions and activities based on questions of wages and hours, has been the attention focused by labor on subsidiary problems, such as industrial health and safety, and these also have been increasing apace.

This interest came first from some of the more foresighted groups, such as the needle trade unions which have even established their own health services, with full-time staffs of physicians, dentists, and nurses. Other unions have organized or cooperated with health services dealing with the special hazards of their industry. Tunnel workers and "sand hogs" in New York, for instance, have at times assisted the State Labor Department in studies of silicosis.

Another evidence of interest in industrial health on the part of labor is the establishment of a Medical Research Institute by the United Auto Workers in Detroit, Michigan. In addition to its clinical services, the Institute has plans for an educational and promotional program with preparation and distribution of literature, information service, and lectures on industrial hygiene and accident prevention. Another of its activities will be the development of Worker Health and Safety Committees with joint labor-management committees as the ultimate goal. A function of these latter groups will be the promotion of health clauses for union contracts and the development of a program of collective bargaining on matters of health and safety. (See page 776.)

Much has already been accomplished along this line in a number of other industries. According to the *Monthly Labor Review*, a publication of the U. S. Department of Labor, "some agreements provide that sanitary and safety conditions are to be maintained in accordance with the state, county and city laws, and that the company, in cooperation with the union, is to work out a health and safety program."

Other agreements contain the general statement that the company will continue to protect the health and safety of its employees. Some agreements specifically require the company to provide protective equipment. Some establish a safety committee, to make suggestions concerning appliances and working practices, and consisting of one company and one union representative, and one neutral person who is called in to act as arbitrator in the event of disagreement.

Clauses relating to health, safety, and sanitation are contained in most of the agreements in the agricultural machinery industry. Such clauses generally consist of pledges by the employer "to furnish healthful conditions at all times and to provide adequate and modern devices with regard to safety and sanita-

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tion." Disputes arising under this article are usually referred to the regular grievance machinery.

About half of the agreements provide for union participation in the administration of plant health and safety rules generally by means of a special safety committee. The Caterpillar Tractor Company agreement, for example, states: "It is agreed that the union will appoint a safety committee of three to encourage the observance of safety rules and the furtherance of the safety and sanitation programs, with which committee the company's safety representatives will meet once each month at a mutually agreeable time."

Three of the International Harvester Company's agreements, in addition to providing for union participation in the administration of plant safety rules, establish 15-minute rest periods in the morning and afternoon for female employees.

WHAT interest does all this activity hold for the industrial hygienist, be he physician, chemist, or engineer? It should mean a new role—a valuable and interesting part in industrial relations—in the negotiations and discussions which are sure to follow the inclusion of health clauses in labor agreements. It should mean new opportunities when labor unions create safety and industrial hygiene departments for research and education—a recently expressed intention. The official and semi-official industrial hygiene agencies will be called upon to act as impartial arbitrators in these discussions.

The company's industrial hygienist is usually the only person in his organization who is familiar with both the processes in his plant, and the potential health hazards present there. He will be called upon, and in many instances already has been called upon, to sit in on labor-management meetings held for the purpose of discussing environmental conditions in the plant. The results of his tests provide, in the final analysis, the most accurate basis for logical discussion of these conditions. He may even be requested, as in recent instances, to demonstrate to representatives of the union by means of actual tests the absence of health hazards from certain workrooms.

All this he must do with care and diligence, with fairness and accuracy, so that his findings will be accepted by both labor and management without question. If he can build up, by careful impartiality, a feeling of confidence in his reports, much can be done to smooth the way for discussions of industrial health problems. However, it may be that the interpretation of findings will be in question. In these cases the opinions of impartial outside agencies may be necessary. Here, then, is the opportunity for the Federal, state, or municipal bureau, the semi-official agency, the progressive insurance company, or the private consultant to bring about industrial peace.

Within the labor union, industrial hygiene can accomplish much in the way of education and research. By means of lectures, perparation of instructive literature, etc., great strides may be made in enlightening the industrial worker as to the character of the materials with which he works, the caution which is necessary in many instances, the combating of prejudices

Proposed Health, Safety, Group Insurance, and Compensation Clauses

—(Suggested by C.I.O., U.A.W., for Inclusion in Union Contracts)—

1. A Health and Safety Committee shall be set up, to consist of three representatives of the company, including a safety official, and three representatives of labor. (Note: Alternative clause for large companies: A Health and Safety Committee shall be set up for each (appropriate division of plant), to consist of three representatives of the company, including a safety official, and three representatives of the union.) The union shall notify the company of its selection of representatives to serve on this Committee. The union representatives on the Committee shall designate their representative for each shift and for each major unit or department of the company.

2. The union representatives on the Health and Safety Committee may seek the advice, opinion, and suggestions of experts, authorities, and health and safety representatives of the International Union, and for that purpose shall have the right to call such experts, authorities and representatives into the plant, and they shall be permitted by the company to make such investigations as shall be reasonably connected with the purposes of this Committee.

3. The health and Safety Committee shall be considered an adjunct of, and subordinate to, the regular grievance procedure herein set forth. All disputes and disagreements arising under the Health, Safety, and Compensation Clauses of this contract, if not disposed of by the Health and Safety Committee, shall proceed to the final bargaining step provided by this contract (Note: or any other desired step).

4. The company agrees to inform the Health and Safety Committees of the names and natures of substances used in the plant, exposure to which may be unhealthful or dangerous, and upon request to reveal to the Committee the names and natures of any substance or compound used in the plant.

5. The duties of the Health and Safety Committee shall be as follows:

(a) To meet at least once a month on definitely established dates.

(b) To make weekly inspections of the plant, including the first-aid and medical departments.

(c) To make recommendations for the correction of unsafe or harmful conditions and the elimination of unsafe or harmful work practices.

(d) To review and analyze all reports of industrial injury and illness, to investigate the causes of same, and to recommend rules and procedures for the prevention of accidents and diseases and for the promotion of the health and safety of employees.

(e) Subject to grievance procedure, to negotiate and adjust all disputes arising under the health, safety, and compensation clauses of this contract.

(f) To recommend standards for the continued employment or re-employment of employees suffering from disabilities or symptoms.

(g) To promote health and safety education.

(h) To supervise the administration of any group insurance, medical, surgical, and hospital plan, or benefit plan wherein the company is a contributor.

(i) To supervise the handling, distribution, and sale of food and refreshments in the plant.

6. The company agrees to maintain sanitary, safe, and healthful working conditions in the plant, to equip all hazardous machinery with effective safety devices, to maintain precautions against exposure which may cause occupational diseases, poisoning or their symptoms and to furnish without cost to employees whatever equipment and clothing may be needed by them for the safe, healthful and protected performance of their jobs. All other clothing or equipment which is subject to damage or excessive wear by reason of the special nature of the employment will also be furnished by the company.

7. The company agrees that all industrial injuries and diseases and absences of three days or more for which the given reason is illness shall be reported promptly and fully to the employees' steward or committeeman and to the Health and Safety Committee.

8. The company agrees to maintain full time, on all shifts, adequate emergency, dispensary and hospital facilities for treatment of injured employees under the supervision of a licensed physician. Any unlicensed medical personnel shall be under the direct supervision of such licensed physician. The name of the physician in attendance shall be conspicuously posted in the examination room. First aid men and nurses shall not remove foreign bodies from eyes, give medication, or prescribe treatment. All first-aid personnel shall be designated by appropriate uniform or insignia.

9. Free physical examinations made by qualified medical examiners including lung x-ray, standard luetic tests, and urinalysis, shall be given annually to each regular employee, as well as to all new employees before hiring. Each employee shall be furnished a copy of all physician's reports and laboratory tests made by the company or its insurer. However, passing a physical examination shall not be made a condition of re-employment or continued employment except in the case of an active communicable disease. No person shall be denied employment or continuation of employment because of hernia, non-contagious venereal disease, arrested tuberculosis, or other non-disabling, non-communicable diseases. Should any employee or prospective employee be denied employment because of the results of his physical examination, such case shall be referred to the regular grievance procedure for negotiation. The union may submit certificates from private physicians, and in the event of further dispute the employee shall be sent to a specialist for his opinion. The employee shall remain at work pending settlement of the dispute.

10. No employee shall be discharged, laid off, or refused re-employment by the company because of alleged ill health or disability, if he is in fact capable of performing an available job.

11. No employee shall be required to work on a job or machine, while its safety is being questioned by a member of the Health and Safety Committee, and during such time he shall receive full wages even if transferred to a lower rated job.

12. All employees who suffer symptoms due to occupational exposure even if such exposure is in accordance with accepted standards of safety and no pathological evidence of disease is found, shall be transferred to a more suitable environment without reduction of rate.

based on sad experiences in the past, and the necessity for better personal hygiene and well-balanced diet. This can be one of the most useful functions of the present-day labor organization.

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You are Only as Healthy as Your Teeth

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ONE of today's foremost health problems is the dental condition of industrial workers. Contrary to popular opinion, the capital cause of lost manpower is not occupational disease, it is preventable disease, some of which is dental in origin.

War workers who suffer from toothache and dental infection innocently contribute to enemy success because they slow down production of essential materials.

An employee with a toothache cannot be efficient.

It has been estimated that the amount of time lost through general illness is 15 times as great as the time lost from occupational disease and accidents—and every male worker loses an average of eight days yearly and every woman 12.

While many illnesses, such as toothache and colds, do not necessarily remove a worker from his bench or machine they do lower his ability, reduce his efficiency and contribute greatly to production errors and safety.

Bacteria from an infected tooth may produce poison which spreads through the entire body. Arthritis, neuritis, chronic infections of the gastro-intestinal and urinary tracts, eye infections, anemia and general debility often have been traced to infections about the teeth, and they have been relieved or corrected by the removal of such infections.

If the mouth could be kept free from infection, from babyhood through adult life, many of the diseases which afflict man could be sharply reduced and life greatly prolonged.

A recent survey by one of the nation's leading life insurance companies indicated that good teeth are an important factor in increasing the length of life. Out of 2,530 deaths, 22.5% showed definite infection of teeth or mouth, and in nearly 10% of the cases the physician stated infection was "actually a causative factor in the death of the insured."

A survey conducted by the University of Illinois College of Dentistry shows that war workers in particular are subject to certain specific mouth troubles. Dusts, gases and acids are the principal mouth hazards. The damage which they do to the teeth and mouth, however, depends to a great extent on the kind of mouth they enter. If it is clean and free from tooth decay the dust, gas and acids may do little harm.

Elimination of dental infection, better oral hygiene and more adequate dental care would aid every American in the digestion and assimilation of nourishing foods. This, in turn, would help improve health, generate energy and prevent illness. Thus, the individual worker and the war effort would mutually profit.

Some Medicolegal Aspects

—Of Industrial Practice—

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DURING the past ten years the number of states which have passed or have had under consideration legislative provisions for the compensation of disability due to occupational diseases has been greatly increased. With this has come a stimulation of scientific interest and effort, not only with respect to the diagnosis and evaluation of disability from occupational diseases, but also, and what has been found more important, a more critical application of sound information with respect to etiology. The latter phenomenon has been associated with the development of industrial hygiene engineering principles and the application of these, both in prevention and investigation.

Experience has shown, however, that in the adjudication of claims, particularly with respect to occupational diseases, there are still complicated problems arising, apparently because of lack of general knowledge of the subject, the existence of a group of intangibles which are more complicated and difficult of demonstration as compared with the factors ordinarily associated with industrial accidental injuries, and, perhaps not least of all, the tendency to overemphasize the importance of the effects of trauma, with the result that there has been inadequate instruction, both post-graduate and undergraduate, in the scientific appraisal of the occupational diseases. For these and other reasons, this paper will be devoted entirely to a discussion of the medicolegal aspects of occupational diseases.

Previous experience over an extended period with medicolegal cases of occupational disease very well indicates that many physicians have viewed such instances as purely diagnostic problems, and have had little or no consideration for the etiological background in industry. This concerns the measurement of industrial exposure by industrial hygiene engineering methods. The ordinary approach to the problem may seem sufficient to the practitioner who is interested only in the diagnosis and treatment of cases, but it rarely ever measures up to the standards necessary in the appraisal of the various factors which must be considered in the adjudication of compensation claims. For example, it is an ordinary experience for the physician to accept the patient's statement that he was exposed to lead and, therefore, to conclude that there was a lead hazard present in his occupation simply because lead was being used or handled. In all instances of this kind, and similar ones, it is necessary to know the extent and severity of the exposure, so that it will be possible to know that an occupational disease could have been contracted in such an environment.

It is common history that the employer takes a different point of view and, in such instances, is not satisfied with such appraisals of the etiological relationships as are ordinarily done without specific industrial hygiene engineering methods of investigation. Clearly the employer does not want to pay, and cannot be expected to pay, for something which did not originate in the industrial environment of his place of business. Contrariwise, the employee is certainly entitled to compensation for disability arising from a true oc-

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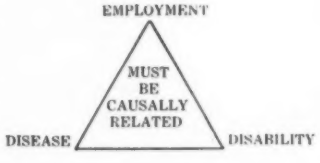
cupational disease if it has been contracted in the working place of his most recent employer. We believe such principles to be equitable. We do know, however, that in trying to establish such relationships, there are many complicated factors arising, and it is the purpose of this paper to simplify at least somewhat, an approach to these principles and their application. We shall, therefore, discuss fundamental principles, some practical methods, some recent compensation experiences—giving some case protocols which illustrate different types of occupational disease medicolegally, including some suggestions in addition which have come from the Industrial Commission of Utah—and, finally, attempt to reach some sound conclusions based upon this material.

Fundamental Principles and Practical Methods

FIRST of importance among the fundamental principles is the establishment of what we may call the medicolegal triad, in which it is to be shown that there is a clear relationship between employment, disease, and disability—that these are causally related.



It should be remembered that we are speaking of an *occupational* disease; moreover, it should be kept in mind that we are speaking of a *disease;* the theory of all compensation laws is that a worker is compensated because of *disability*. In the establishment of the medicolegal triad, the following postulates in the form of questions should be considered, if the case is to be found a meritorious one:

1. Do working conditions of employee represent an actual occupational disease hazard? (This does not mean mere exposure, but does mean that the exposure constitutes an actual occupational disease hazard.)
2. Has the employee a real occupational disease as claimed? (Here differentiation must be made from the diseases of ordinary life to which the general public is exposed outside of employment.)
3. Was the occupational disease in question contracted while working for the employer against whom the claim has been filed? (Here come into play the factors of cause and effect.)
4. Is the employee disabled from the effects of the occupational disease which he alleges to have contracted in the employment of the defendant employer? (Here diagnosis alone is not sufficient, but there must be shown a definite cause and effect relationship, as well as disability arising from the occupational disease.)

It is obvious that the factors involved in the medicolegal consideration of occupational diseases present a situation which is far more complicated and intangible than in instances of most industrial injuries. When a man is injured, except in unusual cases, it is fairly easy to trace the cause of the injury, and it is far more easy to demonstrate disability than is usually true in instances of occupational disease. A fracture, for example, a rather common form of industrial injury, can be more readily demonstrated, and consequent disability observed and measured, than a case of lead poisoning.

It has become evident, therefore, that one needs a guide as to the various possibilities which may result from different combinations of the factors of employment disease, and disability. It is part of the purpose of this paper to point out case types which may occur through different combinations of these variables and to illustrate these case types by case histories selected at random from actual practice. The following table shows the possibilities in tabulated form:

	Case Types			
	I	II	III	IV
1. Employment exposure positive	X	O	O	O
2. Claimant has occupational disease	X	X	O	O
3. Claimant is disabled	X	X	X	O

By referring to this table, it is easily seen that in Case Type I, all the requirements are satisfied for a meritorious claim. In Case Type II, the employment exposure was not sufficient to cause an occupational disease, but the claimant had an occupational disease which he contracted elsewhere and was disabled from that disease. In Case Type III, while the employment exposure was not sufficient to produce an occupational disease, and while the claimant did not have an occupational disease, he was disabled because of a non-occupational affliction and, therefore, under the existing principles, the employer should not have been held liable. In Case Type IV, it is observed that the exposure was not sufficient to cause the disease, the claimant did not have an occupational disease, and he was not disabled, which is clearly a case where the employer had no liability.

Case Protocols

THE following case histories illustrate the different types of possibilities previously shown:

Case Type I—F. G., age 26, was engaged for 14 months in using benzol cement, and working on a laminating machine which made use of benzol in the cement and also as a cleaner. The atmosphere contained more than the permissible amount of 100 parts of benzol per million parts of air at different places throughout the workroom.

For five months, the claimant had been dizzy and weak, had soreness of the muscles, purple blotches on the skin and a skin eruption on the back and the abdomen, and bleeding of the gums. Blood examinations showed an anemia, and he had been put on a special diet and had been given two transfusions. Meanwhile he had lost 14 pounds in weight, and had become so weak that he had not been able to do light work in another department.

When he presented himself for recent examination, there was a yellowish cast to the skin and a bluish cast to the whites of the eyes. The mucous membranes were pale, and there was one small subcutaneous hemorrhage over the middle of the right collar bone. The blood examination showed the remarkably low white cell count of 950 per cubic millimeter, and the red cells numbered 2,280,000; hemoglobin was 54%, and the color index was 0.76. A severe anemia was thus apparent.

Shortly after this examination the patient was put into the hospital for observation. Smears of bone marrow were taken to exclude malignant disease. Liver extract was given by mouth and injection of liver extract intramuscularly. X-ray treatment was given over the long bones and blood transfusion was done. Apparently none of these things did very much good, as, finally, two drugs called Lextron and Reticulogen were used to good effect over a period of almost two months.

On leaving the hospital after two months of treatment, the red cells numbered 3,500,000, the hemoglobin was 80%, and the man had gained 10 pounds in weight. Only one reading of the white cells was made about nine days after leaving the hospital, when they numbered 4200.

The man was then treated twice a week on office calls, and was finally discharged approximately seven months after the beginning of his hospitalization, with red cells numbering 5,000,000 and hemoglobin of 90%.

This man has been at work ever since in the same organization, but not exposed to benzol. He was paid 22-1/7 weeks' compensation, totalling $288.96, and was also given a lump sum settlement of $300.00, making a total of $588.96. The medical treatment in this case cost $544.71, thus making a total of $1,133.67.

Case Type II—P. N., age 48, had been occupied at granite cutting for approximately 35 years. During most of this time (up to 1935) there had been no protective devices used in his occupation. His last employment for four and a half years involved no cutting processes, and an occupational dust study revealed not only the absence of a silicosis hazard, but conditions which are comparable to clerical occupations.

Medical examination showed him to be short of breath and weak on exertion, with the loss of 30 pounds in weight for the past two and a half years; he had an intermittent cough and raised a great deal of sputum which was negative for tubercle bacilli on eight consecutive examinations; guinea-pig inoculation and culture tests were also negative for tubercle bacilli. The sputum, however, contained other types of bacteria. The x-ray films of the chest showed findings of a moderately advanced silicosis with evidence of infection. He was totally disabled, as confirmed by clinical and laboratory examinations.

The case was tried in a common law court and a jury awarded a verdict of $5000.00, although the last employer was not proved liable.

Case Type III—J. A., age 24, operated an automatic machine in a metal products manufacturing company for almost five years. An extensive industrial hygiene survey involving measurements of organic solvent vapors failed to show any occupational disease hazards associated with the working conditions.

Medical examination showed a chronic tuberculosis of the right lung with a cavity in the upper lobe; compression was maintained by a succession of pneumothorax treatments. The patient was ambulatory and had gained weight. The sputum, having once been positive, had become negative. The cough had disappeared and there were no other symptoms.

This patient, however, was totally disabled at the time of this record.

This case was dismissed because of repeated requests for continuances by claimant's legal counsel.

Case Type IV—A. J., age 47, had worked for almost five years handling a vulcanized rubber compound containing lead before vulcanization. Industrial hygiene investigation disclosed no lead hazard in his employment.

Previous medical examinations yielded the information that the patient had been a plumber for several years. Various diagnoses, including duodenal ulcer and lead poisoning, had been made in a university clinic. Periodic examinations of the urine had shown impossible amounts of lead, due either to contamination or faulty chemical technique.

Recent medical investigation disclosed indefinite symptoms with no apparent or real correlation with physical findings. There was no clinical or laboratory evidence of lead effects (this included a neurological and psychiatric examination, which were both negative in all respects). There were no objective physical findings of any disability.

It was explained to the man that he did not have lead poisoning and that he was not disabled. The employer agreed to pay nine months' temporary total compensation; the employee returned to work October 16, 1938, and has been there ever since.

The Medicolegal Triad and its Application

IN THE practical application of the medicolegal triad previously cited and explained, one considers employment (etiology); disease (specific and differential diagnosis); and disability (functional and anatomical).

The following principles are important in the appraisal of occupation and environment:

1. Exposure not a hazard—unless nature and extent is positive.
2. Must know materials, processes, equipment and how used.
3. Measure exposure by scientific sampling and analytical methods.
4. Evaluate exposure data in terms of permissible standards and clinical correlation.
5. Appraisal of efficiency of protective devices.

With respect to the appraisal of history and clinical findings in making specific and differential diagnosis, the following items are to be considered:

1. Specific, positive etiology.
2. Detailed occupational history, past and recent.
3. Detailed medical history.
4. Careful physical examination.
5. Specific clinical laboratory data.
6. Differentiate non-occupational and other occupational syndromes.

With regard to the appraisal of work ability, a scientific study should include the following:

1. Detailed knowledge of environment and job requirements.
2. Objective data on abnormal clinical and laboratory findings, directly related to occupation.
3. Correlation of (1) and (2) for work ability appraisal.
4. Criteria available.

Recent Compensation Experiences

IT IS WELL in our discussion to include some of the compensation experiences of recent times in the various states, so that there may be a better understanding of what can be expected under the present disability compensation laws. The experience in the State of Utah, for example, since July 1, 1941, (the effective date of the act) was as follows:

CASES INVOLVING OCCUPATIONAL DISEASES FILED SINCE JULY 1, 1941 (UTAH)

Dermatits	166
Silicosis	26
Silicosis (fatal)	15
Lead	25
Bursitis	13
Arsenic	2
Hydrogen sulphide	1
Halogenated hydrocarbons	1

For the year 1942, occupational diseases in Illinois showed the following data:

OCCUPATIONAL DISEASES IN ILLINOIS CLOSED CASES, 1942

Causes	No.	Av. Wks. Dis.	Av. Comp. Cost
TOTAL	494	20.9	$311
Skin irritation	236	5.4	72
*Poisons (63)	102	19.1	264
*Miscellaneous (48)	59	15.7	242
*Dust (48)	55	97.9	1552
Not reported	23	22.4	295
Infections	19	13.7	166

*63 means lead; 48 bursitis and tenosynovitis; 48 silicosis, respectively.

The Michigan Department of Health reported that

during the calendar year 1943, 2,241 occupational disease cases were filed, according to the records:

CASES INVOLVING OCCUPATIONAL DISEASES FILED IN MICHIGAN—YEAR 1943

Dermatitis (all causes)	1932
Hernia	101
Pneumoconiosis (non-silicotic)	75
Inflammatory conditions	57
Silicosis	40
Lead poisoning	4
Carbon monoxide poisoning	4
Flash burns (welding)	3
Miscellaneous	25

If one were to make a general comment with respect to most experience in compensation cases for occupational diseases, it could be stated with good authority that dermatitis is the most frequent and the least severe and, therefore, the least costly; and that silicosis, while not great in frequency, is the most severe and, therefore, the most costly.

Utah Experience

THE author is indebted to Commissioner OTTO A. WIESLEY, Commissioner of Workmen's Compensation for Utah, for the following points (in a personal communication) which are summarized:

1. The new occupational disease disability law which became effective July 1, 1941, has not developed as many cases as the proponents of the act anticipated. Of the 27 occupational diseases listed, only seven have been called to the attention of the commission, as previously noted in the table. It may be that lack of experience of the average physician in connection with diseases listed in the statute may account for the fact that so few have been called to the attention of the commission, and it is possible that many diseases are being overlooked because of lack of experience.

2. With respect to silicosis, reports are often received which are not based on thorough examination, and quite frequently the diagnosis is made without the aid of x-ray films. The statute defines silicosis, and the position has been taken that the diagnosis must conform to the statutory definition in order to justify an award. Moreover, the industrial commission of Utah takes the position that if the employee proves that he has silicosis to a disabling degree, and that his employment has been confined to metal mines or other places where free silicon dioxide dust is present, he has made a *prima facie* case; no time is consumed with reference to the measurement of the exposure or data concerning it.

3. In cases of metal poisoning, including lead, arsenic and others, it is frequently found that laboratory examinations have been entirely omitted and the diagnosis based upon external symptoms and history, with emphasis on history. It also frequently occurs that physicians base diagnosis entirely on the statement of the employee that he has been working in a lead mine or in an ore containing arsenic.

4. As might be expected, the greatest number of claims filed are those due to dermatitis. Although only a few doctors in Utah specialize in skin diseases, be that as it may, it is certain that too little attention is paid to the discovery of primary irritants and the diagnosis of frank dermatitis venanata, when as a matter of fact the employee has been suffering from some allergy which he probably acquired at home or at some other place than that of his employment.

5. It has been suggested by the Commission that the examining physician, and particularly the one who appears on the witness stand, should make a very careful and detailed physical examination and also detailed work history dating back to childhood. The physician must learn not to speculate or guess as to cause and effect, and should be very frank to state that he does not know if that is the case. In other words, careful research and extreme frankness are the two most important qualifications of a good medical witness. It might be added that these experiences are generally true in other states.

Conclusions

IT SEEMS evident that in order to obtain the results desired by the Commission *specific* methods of appraisal and interpretation should be used. These are:

1. Specific etiology.
2. Specific diagnosis and differential diagnosis.
3. Specific scientific precise methods for (1) and (2).
4. Specific methods of disability evaluation.
5. Specific interpretation of this information.

A School of Industrial Health

—Plans of a Proposed Development in the Medical Science Center of Wayne University—

EDGAR H. NORRIS, M.D.,
Detroit

IT WAS with pleasure that I accepted an invitation to appear before you; and I count it a privilege to address this gathering. You are an assemblage of practical men and women. You convene in these meetings because of your desire to discover solutions for those pressing problems that grow out of your daily work. Because of your practical points of view, you may have wondered how the dean of a medical school secured a place on this program. Perhaps, even before I reached this platform, your critical defenses were raised to ward off contamination from the theoretical concepts and the hypothetical reasoning of a pure academician. Lest this be true, allow me haste to set your minds at rest.

It is my conviction that only those who have had actual experience in industry are qualified to opine regarding the practical problems of the health care to be provided for the industrially employed in this great nation. Since it is my good fortune to have had actual experience in industry, my approach to these problems cannot be purely academic. As an industrial employee I was once injured and drew compensation insurance. As a practicing surgeon, I later developed the medical program for a casualty insurance company and became its medical director. The experiences of those years have left indelible impressions. At the outset, therefore, let us subscribe to the principle that knowledge of industry must be the very essence of good medical work in industry. In other words, may we accept the axiom that an intensive and extensive knowledge of industry is the *sine qua non* for good practice in the field of industrial health.

As the dean of Wayne University College of Medicine, in Detroit, Michigan, I have encountered many special problems. Our school, in proportion to the needs of the great metropolitan industrial community it serves, lacks much. Consequently we have spent a great deal of time and energy in the development of plans for a modern Medical Science Center. By its very nature the project is a huge one; it has been estimated that the long-range program will involve an investment of 50 to 100 million dollars. The job thus far has not been easy, but gratifying progress has been made. The promotional state is past; the project has emerged from the visionary realm and

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now represents an adventure in which real and tangible steps are being taken. The 50-acre site for our campus is being acquired, and architectural drawings for the first buildings are being made. Construction will proceed as soon as the availability of materials and labor makes building practicable.

What, you may ask, does all of this have to do with industrial health? There are several answers to this question.

The war and crises such as we now face have focused attention upon the many inadequacies of our educational system. Some of us in medical education have recognized the need for alterations in curriculum and for specific changes in instructional emphasis. Certain of these concern the field of industrial health. The major social changes resultant from this nation's continually expanding industrialization have come about during the past 30 years. On the other hand, the pattern of medical education, which has determined the organization and the curricular provisions of medical schools, was blue-printed at a considerably earlier date. The colleges of medicine of this country vary somewhat in the details of their activities, but all conform to a rather stereotyped organizational pattern. Following this pattern, colleges of medicine have tended to become set in molds, and there is often considerable indisposition to effect major changes in organization. It is probable that this, more than any other fact, explains the lack of thorough-going and extensive courses in industrial health. Although man is fundamentally adaptable, his reactions to change are most often temporary, incidental, and forced adjustments to current or immediate circumstances. Society and its institutions are characterized by a stubborn reluctance, which often amounts to a ponderous inertia, to alterations of pattern. It is because of this fact that leaders, equipped with vision, unselfishness, and pertinacity, become effective only when they gravitate to posts of administrative authority. It cannot be considered strange, therefore, that most important adjustments come about as an indirect result of evolutionary processes and as a direct consequence of the fortuitous concurrence of persons and circumstances. We in Detroit have certain circumstantial advantages favoring the development of a comprehensive educational program in the field of industrial health. Among other advantages, metropolitan Detroit assures the provision of permanent, extensive industrial activity. Indeed, the entire population of Detroit is geared to industry, and the social community probably typifies the purest form of industrial civilization yet known. In developing a *new* Medical Science Center, and in making the necessary adaptations required by a new program, we will not be restrained by the limitations imposed by an out-dated physical plant; rather, we will plan and build for the needs of the program. We will not be bound by the inertia and fixed tradition too often imposed by a large and old faculty; rather, our program will be enhanced by the careful selection of a faculty whose members must possess the vision and realistic eagerness required to conduct an educational program of broad scope and practical effectiveness.

In this paper we will not be concerned with the undergraduate instruction of medical students. There is no question but that every college of medicine should acquaint its undergraduates with the general field of industrial health. Every physician should be graduated with enough knowledge of this subject to assure an intelligent attitude toward the general problems. Twelve or 15 hours will probably suffice in the undergraduate curriculum. In this presentation, however, and in the development of our School of Industrial Health in Detroit, we will be concerned specifically with the educational program necessary for the training of those who are to work as specialists in the health problems of the industrially employed.

To develop a School of Industrial Health certain principles, which are fundamentally axiomatic, must be kept in mind. In the first place, it should be pointed out that during the past 50 years the emphasis in medical thinking has shifted more and more away from diagnosis and cure toward the ideals of preventive medicine. Modern medicine concerns itself just as much with health and the preservation of health as with the diagnosis and cure of disease. Strange as it may seem, however, this philosophy has not become the theme of education in the medical sciences, and no institutions have been built or faculties and curricula organized around this basic concept. A School of Industrial Health must typify the philosophy of preventive medicine.

In the second place, a School of Industrial Health must conduct its educational program largely for the benefit of graduate students. It must be remembered that on this graduate level of training, it is quite impossible to draw a line between teaching and learning. For the training of graduate students, facilities and schedules must, therefore, be arranged not only for the conduct of formal classes but also for the favoring of intensive research. On the graduate level it is not enough for the student to come in contact with the stimulating presence of great professors in the lecture hall and in the clinic. On the graduate level it is not enough for the student to carry away notebooks filled with textbook knowledge. The graduate student must be regarded as an independent thinker; his very presence in such a school bears testimony to the fact that he himself has recognized the need for an added educational discipline. That added discipline can come only from the inclusion of a carefully planned and well-directed investigative program for each student. To satisfy graduate students, the educational experience must be one of instruction and of learning; it must combine teaching and research. But, you may protest, not every student is qualified to do research. I would be the first to agree if you refer to undergraduates or to an unselected group. However, the student body to be found in a School of Industrial Health will be a self-selected group of graduates who, having recognized their educational deficiencies, seek intellectual growth; there is no educational experience that will so complement their preparation for practical work as a first-hand training in the investigative handling of a problem.

The School of Industrial Health should be housed in a building that provides for a large number of small offices and laboratories. The office-laboratory combination should be thought of as the fundamental working unit, and numbers of these should be provided for each of the major departments in the school. Adequate space must always be available in office-laboratory combinations to take care of the needs of every faculty member and every student.

The curriculum of the School of Industrial Health must be made as flexible as possible in order to permit its unhampered evolution. Throughout the school, emphasis in teaching must be placed on practical information. The organization of the School of Industrial Health will include a number of divisions and departments, as presented in the following outline. An idea of the scope of the educational program can perhaps best be grasped by a study of this organizational pattern.

DIVISION OF FUNDAMENTAL RELATIONS:
Department of Physical Preparedness for Industrial Occupations.
Department of Physical Examinations.
Department of Organization and Administration.
Department of Economics and Public Relations (Non-occupational Illness, Utilization of Older Employees, etc.).

DIVISION OF SPECIAL MEDICAL AND SURGICAL RELATIONS:
Department of Industrial Psychology and Psychiatry (Science of Human Relations).
Department of Acute Industrial Surgery.
Department of Restorative Industrial Surgery.
Department of Industrial Ophthalmology.
Department of Industrial Orthopedics.
Department of Industrial Radiology.
Department of Occupational Internal Disease.
Department of Industrial Nutrition.
Department of Industrial Toxicology.
Department of Industrial Dermatology.
Department of Physical Therapy.
Department of Occupational Therapy.
Department of Geographic Medicine.

DIVISION OF ENGINEERING:
Department of Engineering Control of Hazards.
Department of Environmental Hygiene.

DIVISION OF LEGAL AND INSURANCE RELATIONS:
Department of Insurance Theory and Compensation Law.
Department of Forensic Medicine.

DIVISION OF RECORDS AND MASS STATISTICS.

DIVISION OF GRADUATE STUDY IN INDUSTRIAL PROBLEMS.

DIVISION OF CONTINUATION STUDY IN INDUSTRIAL PROBLEMS.

DIVISION OF ADMINISTRATION.

Of course, the degree to which the various departments are developed will differ. The tabular outline just presented is only a master plan or guide indicative of the general range of the program. The faculty will consist of physicians and surgeons trained in their various specialties, of attorneys, or engineers, of insurance experts, of actuaries, accountants, and statisticians, of specialists in public relations, and of others —*all* interested and experienced in the field of industrial health. Such a faculty drawn from colleges of medicine, law, and engineering and from practical workers in industry will constitute an assemblage of scholars and investigators quite different from any other recognized faculty. This is not the faculty of a school of medicine, of law, or engineering, or of public health. This is the faculty of a School of Industrial Health, and it is as distinctively different from other recognized faculties as the field of industrial health is distinctively different from those other professional fields that were institutionalized and accepted by society prior to the industrialization of our country.

FROM here on it seems to me that only those who are intellectually blind can contend against the formal recognition of industrial health as a professional entity in medical practice. It matters not that the majority of those working in the field have been self-trained or taught as apprentices; the same was true for those who worked in the earlier days of the now recognized professions and specialties. It matters not that, until the present, the broad educational program for the formal training of professionals in industrial health has lacked definition and institutionalization; these needs will presently be met.

During the past 27 years we have observed the organization of 15 specialty boards within the field of medicine and surgery. In some instances there were several years of preliminary discussion before the various affiliated agencies agreed on the final organization. In the case of each of these 15* qualifying boards, an educational program has been requisite and has been the factor primarily responsible for their social significance. We have observed the functional results of the operation of these qualifying agencies. No one doubts their importance or challenges their effectiveness. Satisfaction of their requirements assures a better quality of practice. In our opinion, good is resultant not only because the trainees gain more extensive experience in their limited fields but because incidental to their specialty training the students acquire intensive knowledge in the related basic medical and general sciences. Moreover, when the training is more effective, the educational experience forces the student to relate his special knowledge to the other specialized fields of medicine and surgery. The results of such an educational program can only be better doctors and better medical care for society.

At the present time, because of the war, the training of specialists is at low ebb. Very few young men can now elect graduate work. Immediately upon the termination of hostilities, however, the tables will be turned, and the educational facilities of this nation that provide graduate training will be taxed as never before. Now is the time—and it is none too soon—for this country to develop its schools of industrial health. The challenge is indeed demanding.

With the establishment of such schools we strongly advocate the prompt organization of a national qualifying board to certify those physicians who are adequately trained to work as specialists in the field of industrial health. I would even go a step further and recommend that special degrees—perhaps a Master and/or a Doctor of Industrial Health—be conferred by schools of industrial health upon those candidates who shall have completed the required curriculum within not less than three years.

Thus far I have purposely stressed the program for the training of physicians to work in industry. I have hinted that they will need to receive instruction in law and in engineering insofar as these subjects relate to industrial health. But the student body of a School of Industrial Health will not consist of doctors of medicine only. Comprehensive course work must also be provided for claims and surety executives, for industrial hygiene engineers, for industrial sanitary engineers, for industrial safety engineers, and for nurses and first-aid attendants; special less extensive courses will need to be made available to executives, foremen, and personnel directors. Health is fundamental to the welfare of our country, and it will be an even more important asset in our international competitive relationships in a world grown smaller in the postwar days. In no better way than by the provision of sound courses of instruction for all of those engaged in the health care of the millions industrially employed, can we work to assure the economic independence of this nation. For us the immediate problem is bi-phasic; it involves, first, the organization of faculties and, second, the development of the sound course work to be presented. If we are to meet the challenge, this problem must be solved in the months just ahead in order that we may be ready when the boys come home.

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*American Board of Otolaryngology, 1916; American Board of Ophthalmology, 1917; American Board of Obstetrics and Gynecology, 1930; American Board of Dermatology and Syphilology, 1932; American Board of Pediatrics, 1933; American Board of Orthopedic Surgery, 1934; American Board of Psychiatry and Neurology, 1934; American Board of Radiology, 1934; American Board of Urology, 1934; American Board of Internal Medicine, 1936; American Board of Pathology, 1936; American Board of Surgery, 1937; American Board of Neurological Surgery, 1939; American Board of Anesthesiology, 1941; American Board of Plastic Surgery, 1941.

Clinical, Electrocardiographic and Pathologic Correlation of Certain Common Cardiac Conditions, and Evaluation of the Cardiac Patient in Industry

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Rahway, New Jersey

THE importance to the industrial physician of recognizing cardiac disease in a new employee and in assessing its significance in labor and office personnel already employed cannot be over-estimated. In the following sections an attempt has been made to outline under each common cardiac disease:

1. Measures considered important in assessing the cardiac status.
2. The criteria on which employability is determined.
3. The criteria governing selection of a work station compatible with the cardiac condition.
4. The prognosis of probable duration of useful employment based on the natural history of the disease.

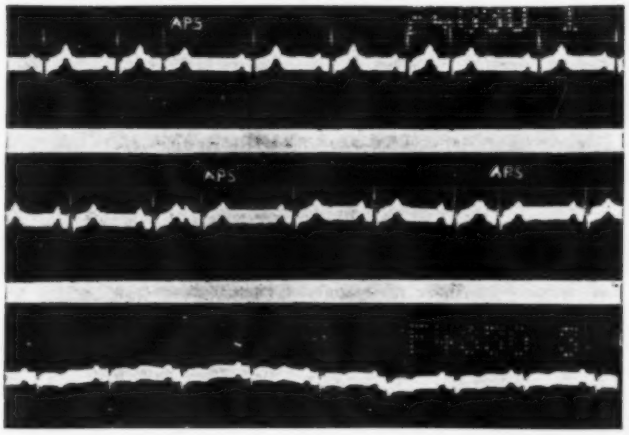
The diagnostic methods useful to the industrial physician in considering cardiac employees are briefly presented in each section.

Acute Rheumatic Heart Disease

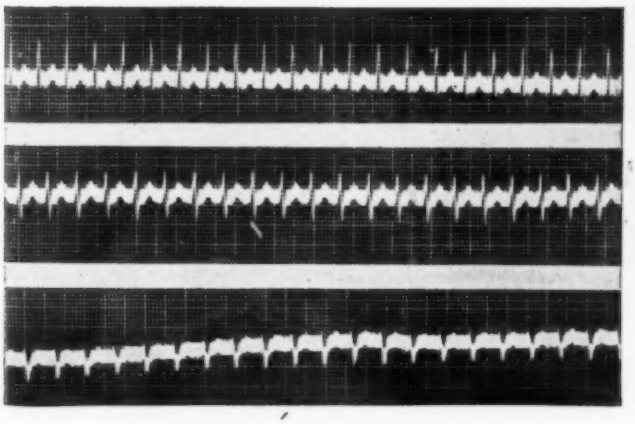
MURMURS indicating the presence of rheumatic heart disease are frequently present in persons presenting themselves for employment. The important question to be decided is whether or not the disease process is in an active stage. If it is, the patient should be at complete rest and, obviously, is not suitable for industrial work. The temperature, white blood count and sedimentation rate are valuable aids, as is also the electrocardiogram. In the early stages electrocardiographic findings are dependent upon the degree of rheumatic activity involving the heart muscle. This is manifest by disturbances in rhythm, irritability and conductivity. Alterations in the configuration of the waves are unusual unless pericarditis is present.

Manifestations of Rheumatic Activity

Disturbances in Irritability

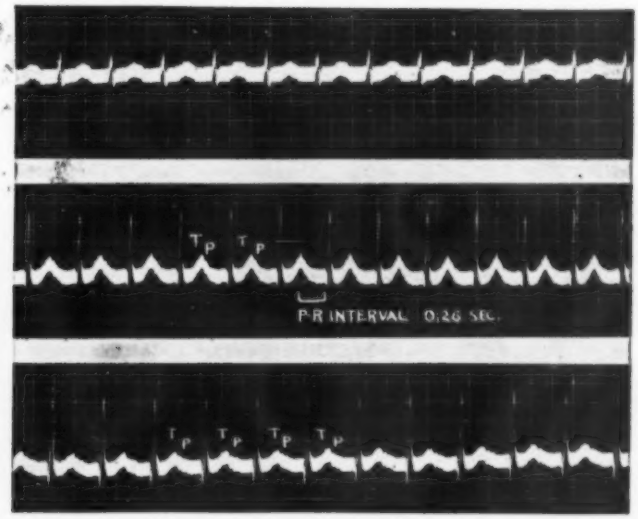


Multiple Auricular Premature Systoles.

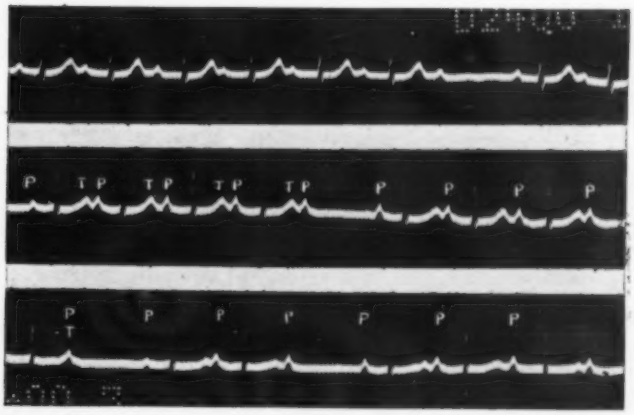


Auricular Tachycardia.

Disturbances in Conductivity

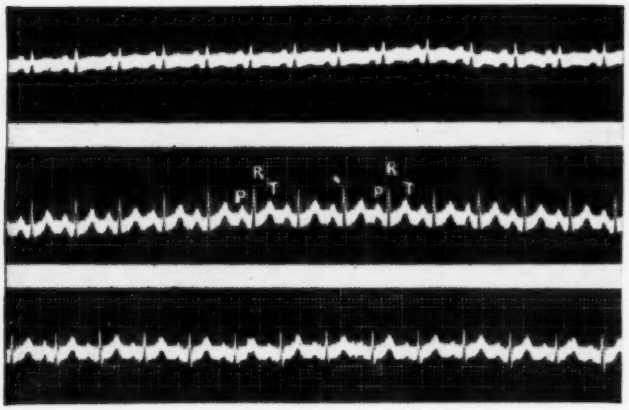


Prolonged P-R interval: above 0.20 seconds in adults and 0.16 seconds in children.

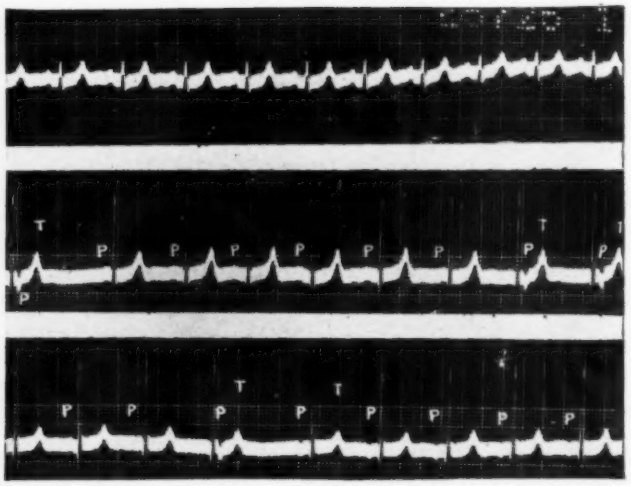


Dropped Beats—Wenckebach Phenomena: Note gradual prolongation of P-R intervals until QRS complex is 'dropped.' Auricular rate is regular. Ventricular rhythm is irregular depending upon number of dropped beats.

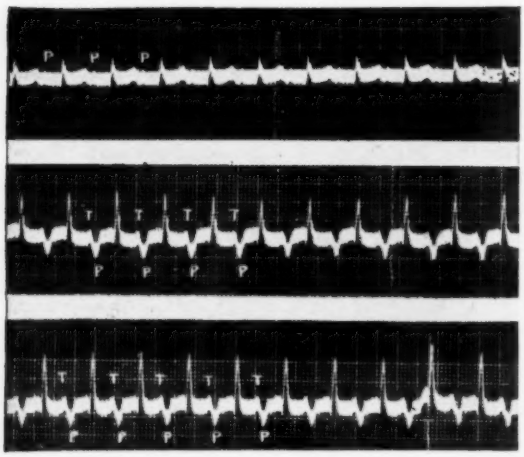
Disturbances in Rhythm



Sinus Tachycardia. Auricular and ventricular rates above 100 per minute.

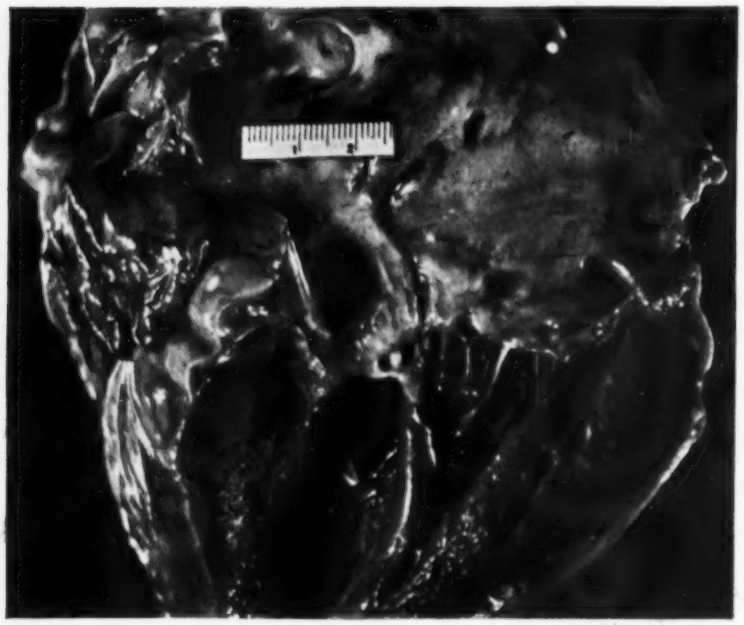


Wandering Pacemaker. Note varying P waves and P-R intervals in leads II and III.



A-V Nodal Tachycardia. Note inverted P waves in leads II and III indicating retrograde conduction of wave of excitation over auricular musculature.

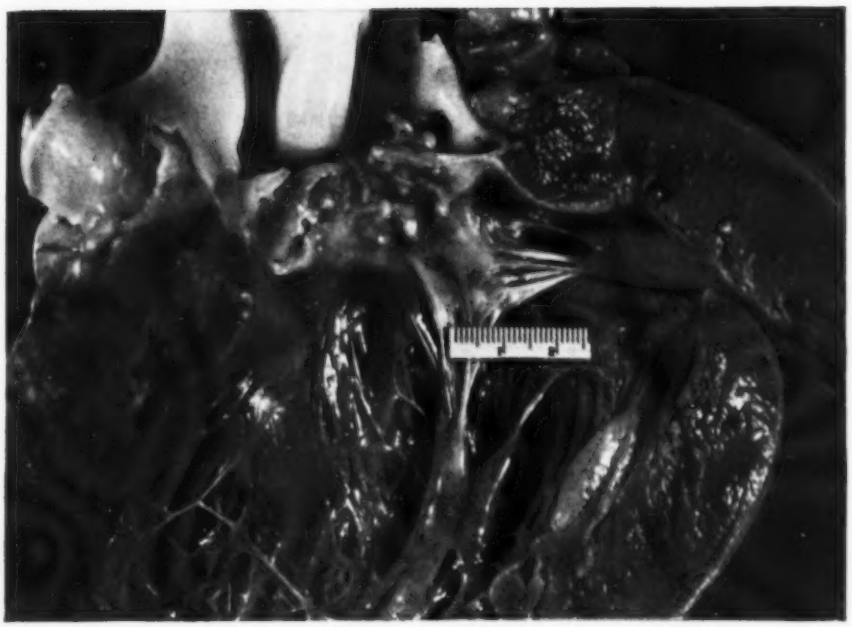
Manifestations of Rheumatic Activity



ABOVE:
Acute valvulitis of mitral valve with verrucae.
Male, white, age 23; sudden death while digging trench.

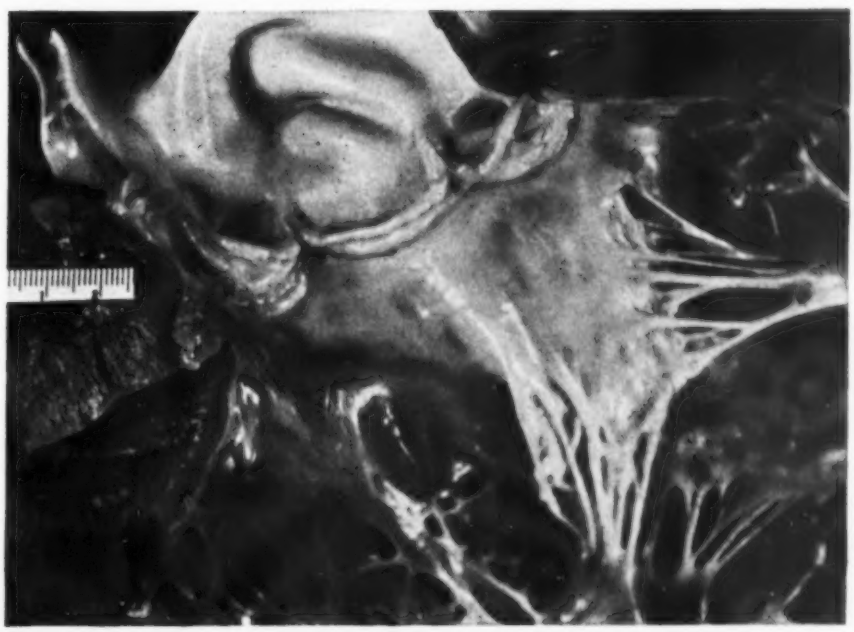
LEFT:
Chronic Valvular Deformity
Tight mitral stenosis without verrucae.
Female, white, age 25; death in hospital from congestive failure.

Chronic Rheumatic Heart Disease

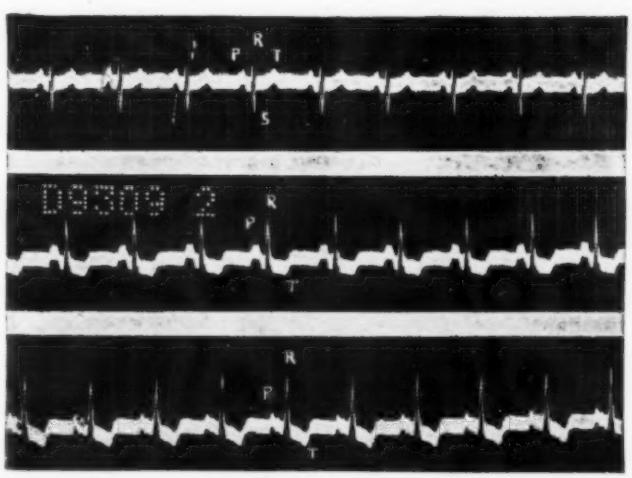


ABOVE:
Chronic Valvular Deformity—
Calcific Aortic Valve.
Male, white, age 15; sudden death in playground.
Weight of heart 610 grams.

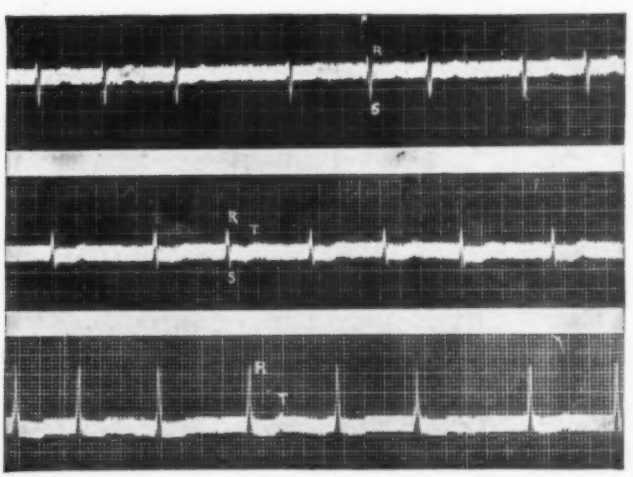
THE electrocardiograph picture is dependent upon the extent of valvular deformity, compensatory myocardial hypertrophy and myocardial scarring. The typical electrocardiogram of a patient with mitral stenosis reveals right deviation of electrical axis due to hypertrophy of right ventricular musculature, abnormally broad and split P waves on the basis of left auricular enlargement, and abnormal T waves of leads 2 and 3. In combined aortic and mitral disease, dependent upon the degree and duration of aortic valve involvement, no axis or even left axis deviation may be present. Manifestations of rheumatic activity may be superimposed at any stage. With the advent of auricular fibrillation, which commonly occurs in the late stages of the disease, the basic configuration of the QRS complex and T waves is maintained.



RIGHT:
Chronic Valvular Deformity—
Aortic Regurgitation.
Male, colored, age 18; death in hospital from congestive failure.
Weight of heart 1250 grams.



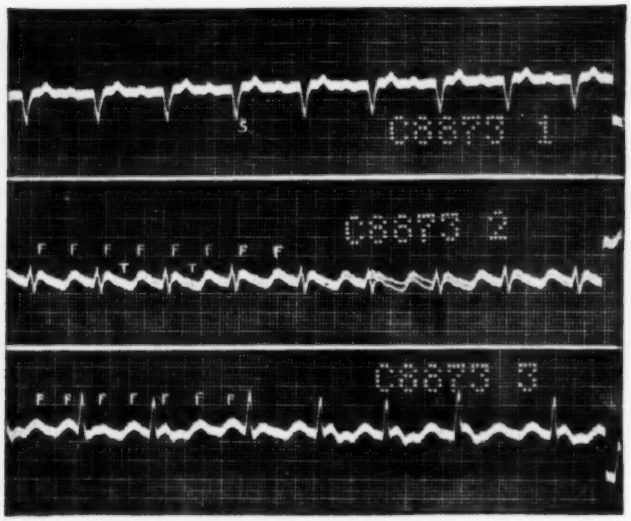
Regular sinus rhythm; right axis deviation. Patient with mitral stenosis and insufficiency.



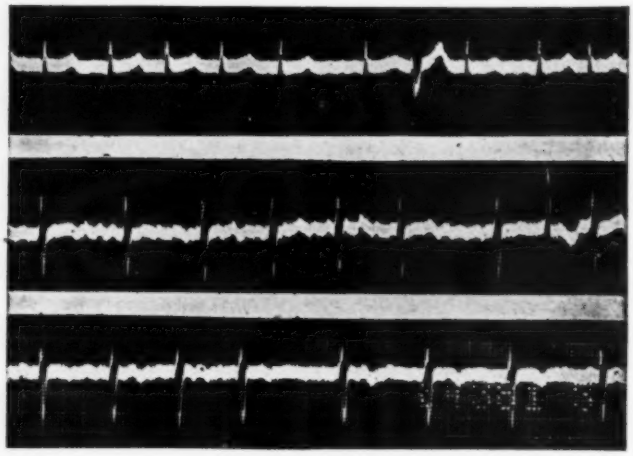
Auricular fibrillation; right axis deviation. Patient with mitral stenosis and insufficiency.

Chronic Rheumatic Heart Disease (Continued)

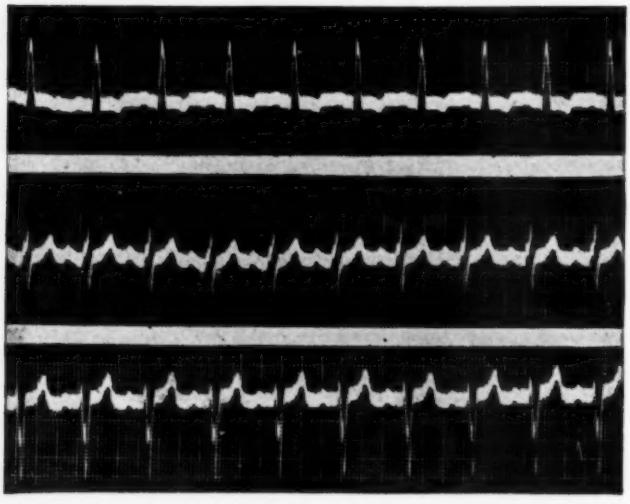
APPLICANTS with inactive rheumatic heart disease are frequently employable. The criterion here is usually the presence of any sign of congestive failure or marked cardiac enlargement. The electrocardiogram is of comparatively limited value in evaluating this condition although it may show the typical findings illustrated. Although sudden death occurred in one of the cases illustrated, this is less frequent than gradual congestive failure, so that, in the well compensated case, there is usually no great industrial hazard.



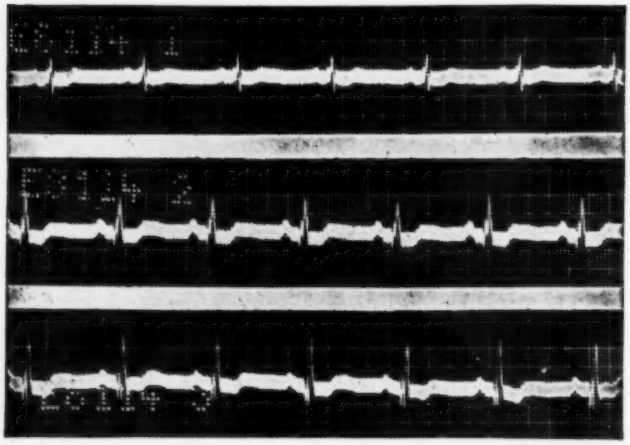
Auricular flutter and right axis deviation. Patient with advanced mitral stenosis and insufficiency.



Auricular fibrillation and left axis deviation. Patient with combined aortic and mitral disease. Note similarity to type of curve seen in hypertensive heart disease.



Regular sinus rhythm; left axis deviation. Patient with combined aortic and mitral disease.

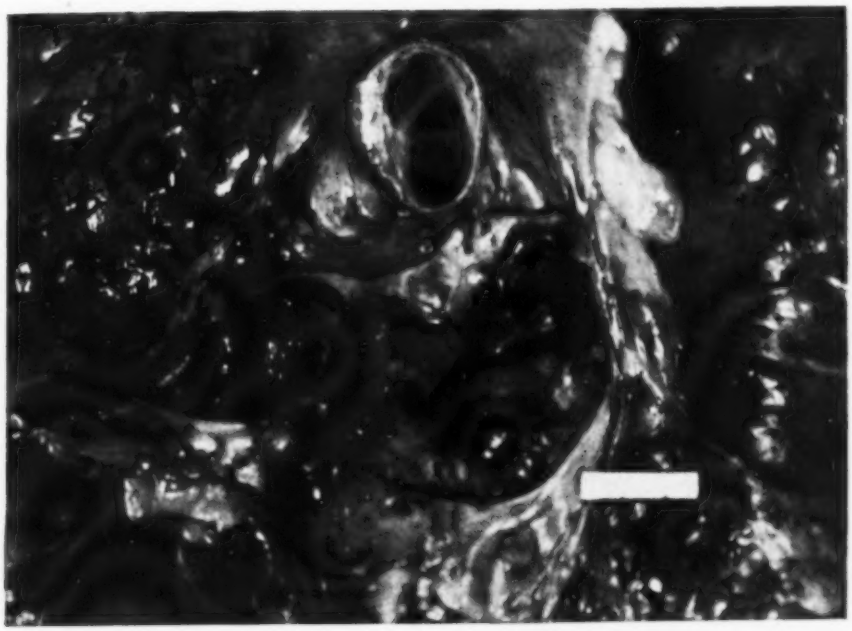


Regular sinus rhythm; no axis deviation. Patient with combined aortic and mitral disease.

Pulmonary Embolism

ALTHOUGH not strictly speaking a disease of the heart itself, pulmonary embolism may produce acute cor pulmonale. Differential diagnosis from coronary thrombosis may be difficult. However, a sudden onset of chest pain, hemoptysis, and the electrocardiographic findings illustrated, should lead to suspicion of this condition which may be substantiated by the discovery of peripheral thrombophlebitis as a source of the embolus. In many cases, the pulmonary complication may be the first sign of the thrombotic process. This condition is of interest to industry because of the possibility that it may occur following injuries to the extremities or with any condition which requires bed rest for more than a few days. Correct diagnosis is of particular importance because in some instances it may be possible to prevent further emboli by means of venous ligation and, in rare instances, an embolectomy may be justified. In addition, should the patient recover from the pulmonary embolism, the prognosis as far as cardiac function is concerned, is far superior to that following a coronary thrombosis and, therefore, he may return to work with greater safety and at an earlier date.

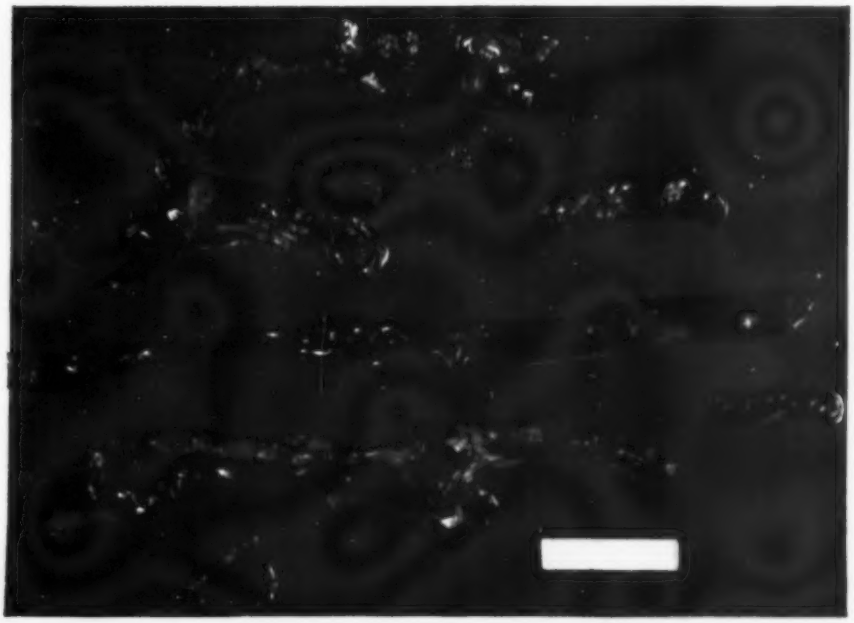
Pulmonary Embolism 'Acute Cor Pulmonale'



IF THE patient survives the acute phase of the attack, a characteristic electrocardiogram simulating that seen in infarction of the posterior wall of the left ventricle may be found. It differs, however, by the presence of an abnormal S wave in lead I, which, if the QRS complex is widened, resembles an atypical right bundle branch block. The chest leads are of little help in the diagnosis.

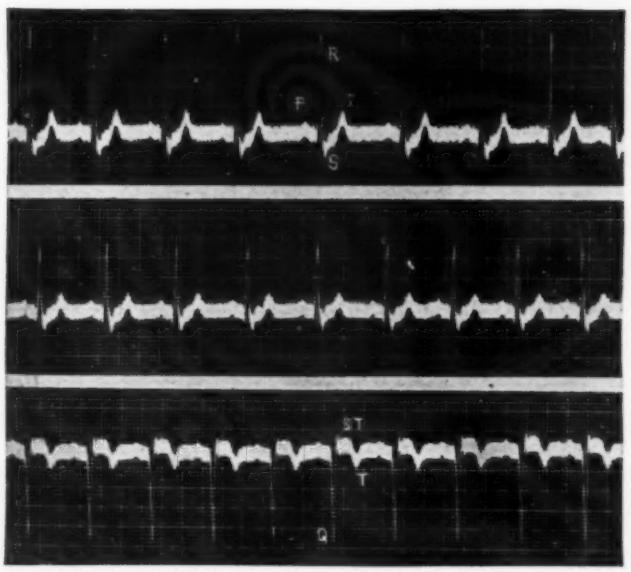
LEFT:
"Acute Cor Pulmonale"
Showing main branches of pulmonary artery stuffed with fragmented embolus. Static thrombosis of veins of lower extremity.
Female, white, age 61; sudden death seven days after cholecystectomy.

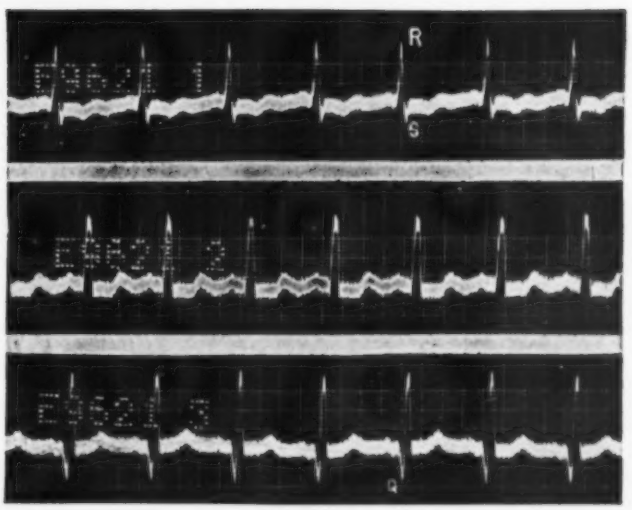
(Characteristic electrocardiographic changes have been noted in a few instances when death has been delayed.)



RIGHT:
"Acute Cor Pulmonale"
Fragmented clots removed from pulmonary artery in this case.

BELOW:
Pulmonary Embolism. Note marked similarity to Q_3T_3 pattern seen in infarction of posterior ventricular wall.

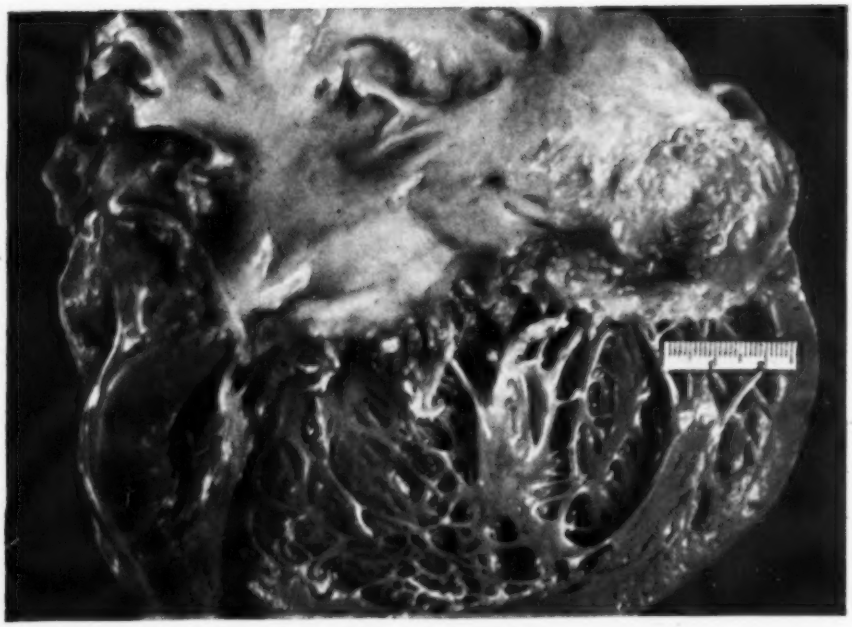




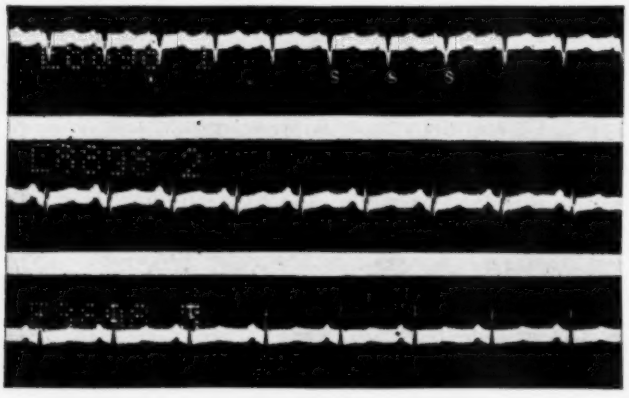
Pulmonary Embolism: Note deep Q wave lead III and S wave lead I. Atypical right bundle branch block.

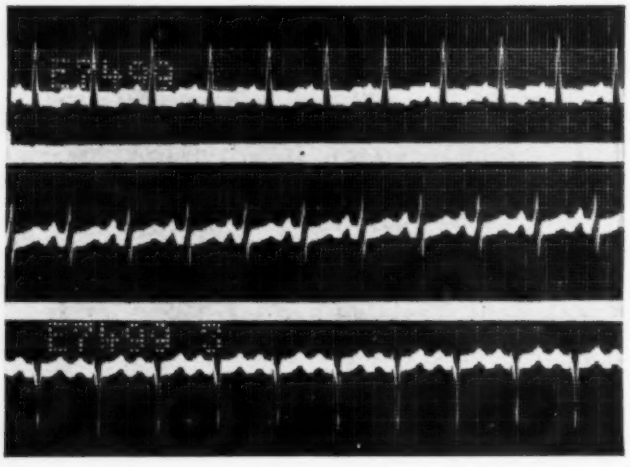
Subacute Bacterial Endocarditis

SUBACUTE bacterial endocarditis may be superimposed on any type of valvular damage. However, the most frequent preceding disease is rheumatic fever. In industrial medical practice the condition is rarely encountered because in the majority of instances there are sufficient signs of systemic illness to prevent the patient from seeking employment. The electrocardiogram is not typical of bacterial endocarditis but rather is of help in diagnosing the underlying heart disease upon which the endocarditis is superimposed. Evidences of rheumatic or congenital heart disease are the most common. Disturbances in rhythm are unusual.

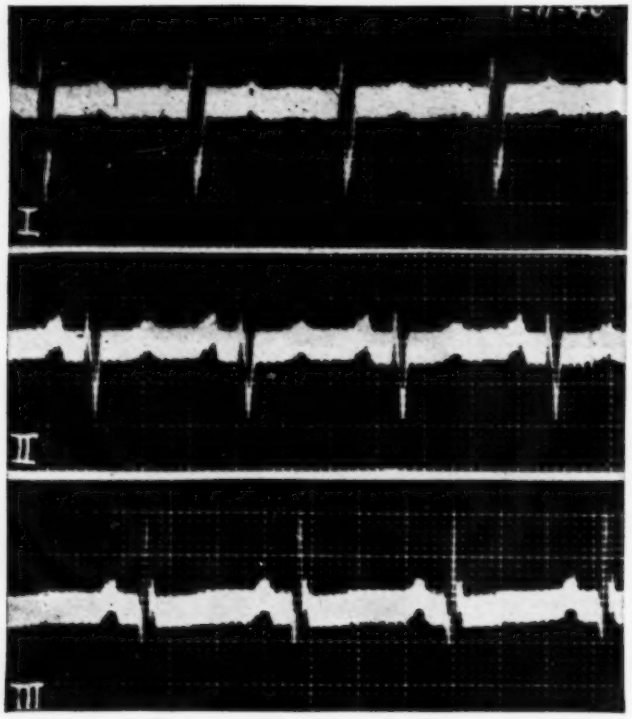


BELOW:
Patient with rheumatic heart disease, mitral stenosis and insufficiency, with bacterial endocarditis on mitral valve. Note typical electrocardiogram of advanced mitral stenosis.

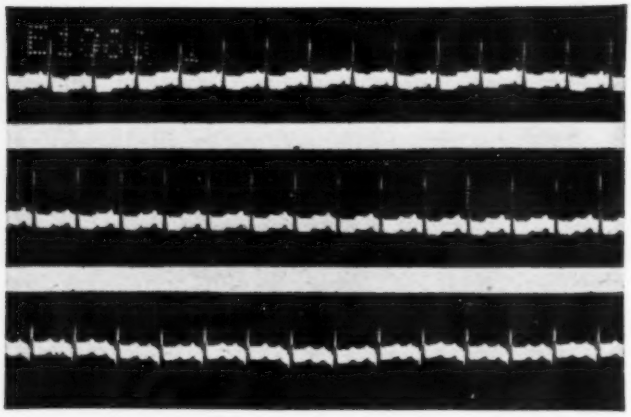




Patient with congenital bicuspid aortic valve. Type of curve is that associated with left ventricular hypertrophy. Note similarity to electrocardiogram illustrating hypertensive heart disease and syphilitic heart disease with aortic insufficiency.



Patient with congenital pulmonary stenosis. Note marked right axis deviation.



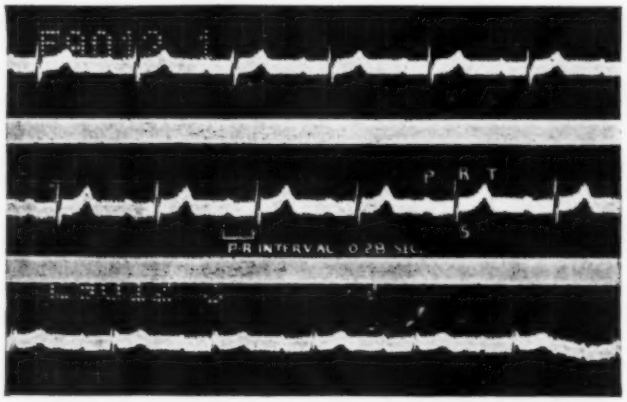
Sinus tachycardia with abnormal T waves, in a patient with sub-acute endocarditis superimposed on calcific aortic valve.

Coronary Arteriosclerosis. Note old infarction over posterior one-half of interventricular septum. Old occlusion of right coronary artery. Male, white, age 50; sudden death in factory.

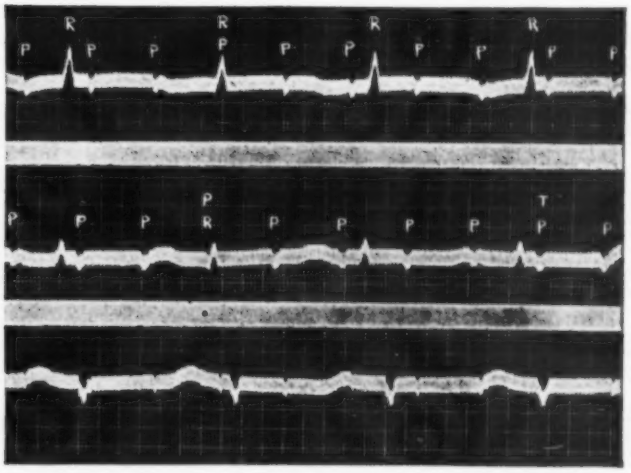
Arteriosclerotic Heart Disease

THE electrocardiogram attains its greatest usefulness as an aid in the diagnosis of myocardial infarction. Typical patterns have been described, but variations are often noted. Changes in the electrocardiogram depend on the position of the infarct, its size, whether it involves the pericardium, the electrocardiographic picture before the advent of the infarct, and the time at which the tracing was taken in respect to the onset of the condition. The chest or precordial leads are of great help in establishing the diagnosis, particularly in infarctions involving the anterior wall of the left ventricle. Progressive changes are the rule in recent heart damages.

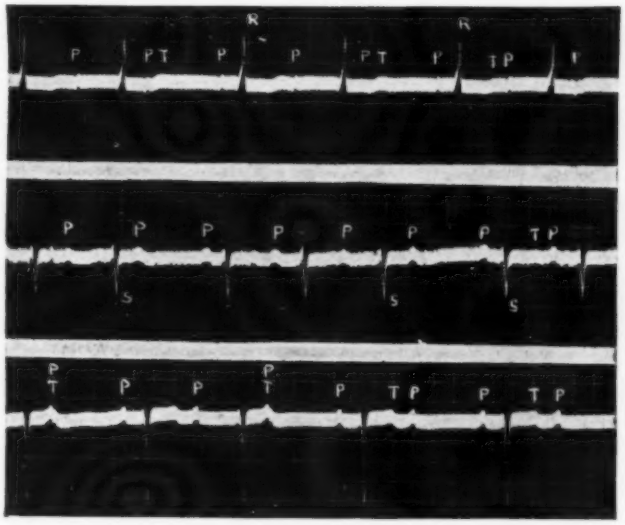
Disturbances in Conduction



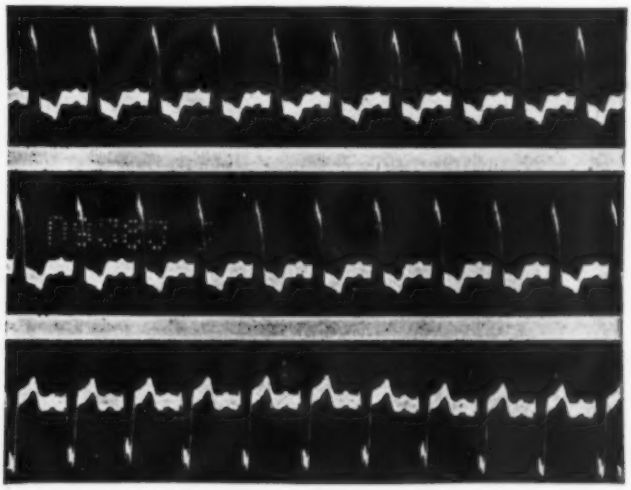
Prolonged P-R Interval, representative of delay in conduction through the junctional tissues.



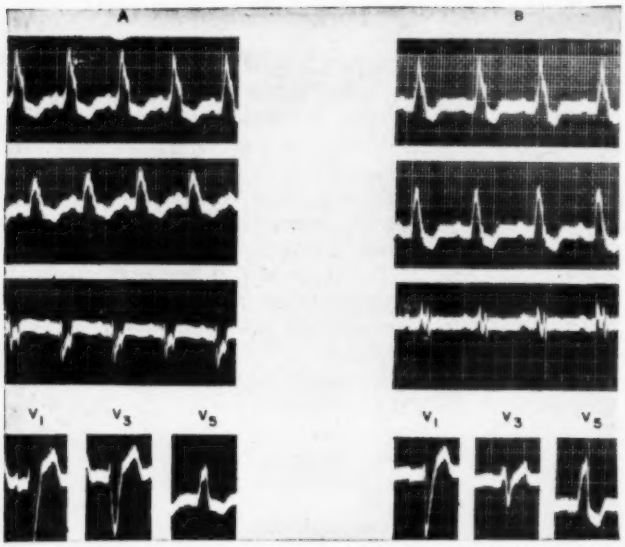
Complete Heart Block. Characterized by complete dissociation of auricular and ventricular rates. The ventricle is controlled by an idioventricular pacemaker.



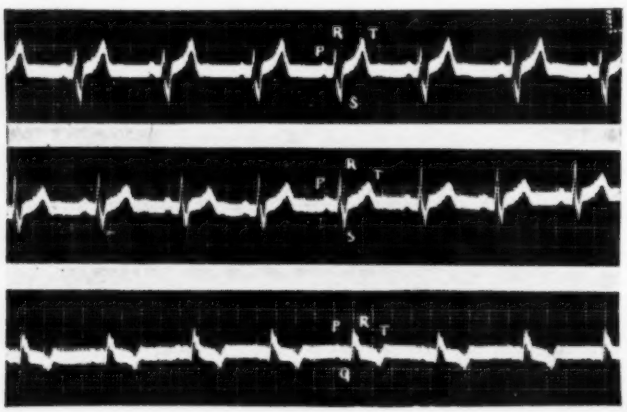
Incomplete A-V Block "Dropped" Beats. Further stage of heart block where the wave of excitation initiated by the sinus node is blocked in the junctional tissues with resultant "dropped" ventricular beats.



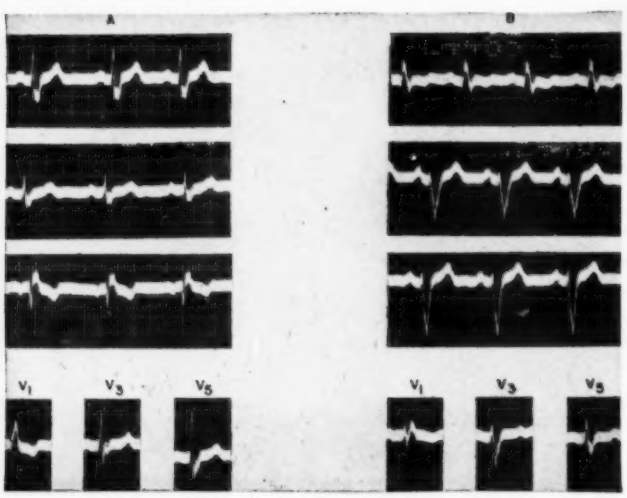
Left Bundle Branch Block. Characterized by wide QRS complex (above 0.10 seconds), slurring and notching of the QRS complex, left axis deviation, and the T waves opposite in direction to the greatest ventricular deflection. The commonest cause of bundle branch block is coronary atherosclerosis.



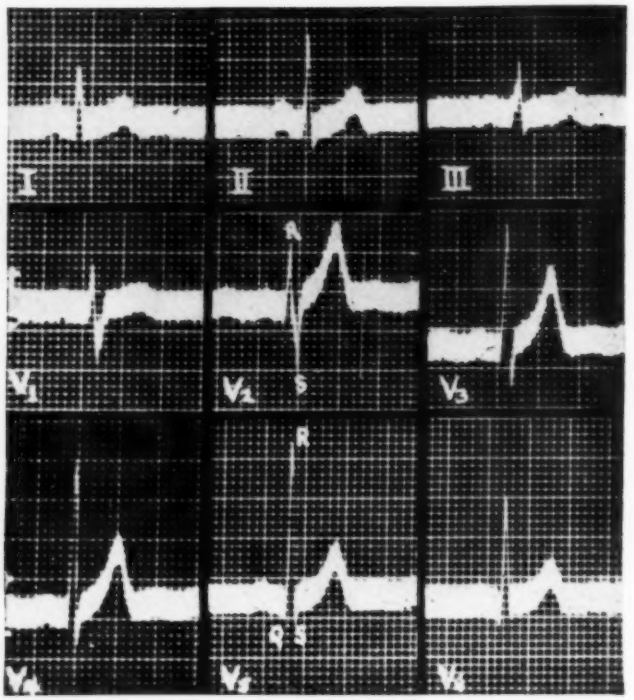
Examples of Left Bundle Branch Block with Precordial Leads. Note late cessation of R wave in lead V_5 and abnormal T wave in same lead.



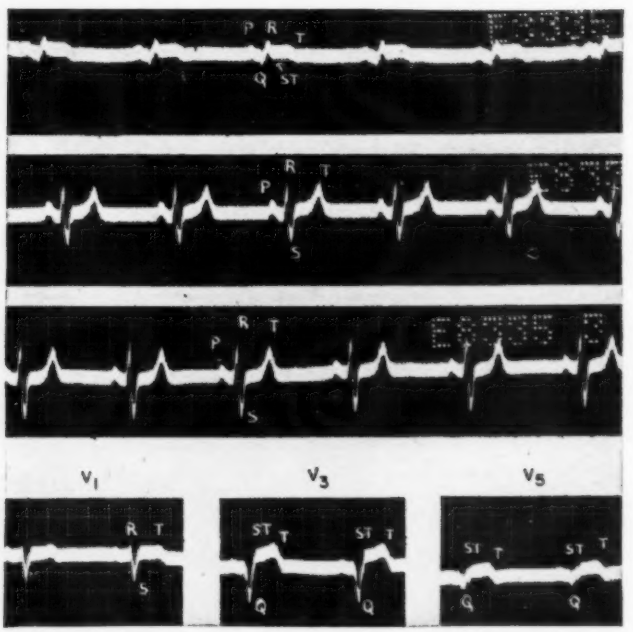
Right Bundle Branch Block. Characterized by abnormally deep S wave lead I with resultant right axis deviation, T waves opposite in direction to the main ventricular deflection, and widened QRS complex (above 0.10 seconds).



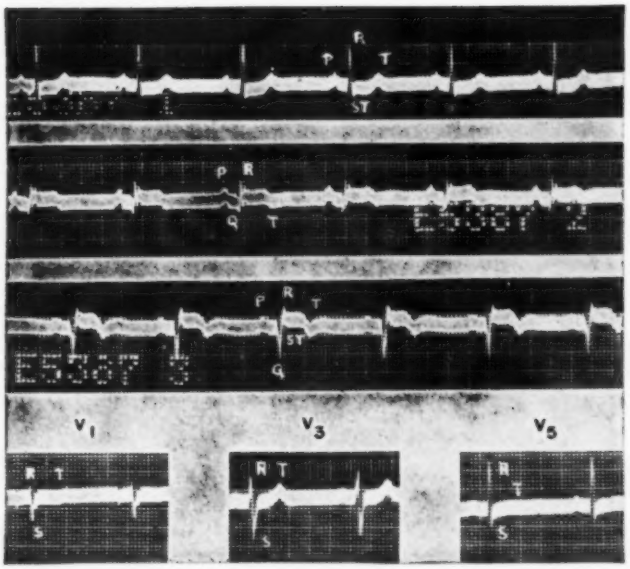
Examples of Right Bundle Branch Block with Precordial Leads. Both types, although differing markedly in the standard leads, are similar according to the precordial potentials from various points across the chest. Note the late cessation of positive deflection over right side of precordium (V_1) and inverted T wave at this point.



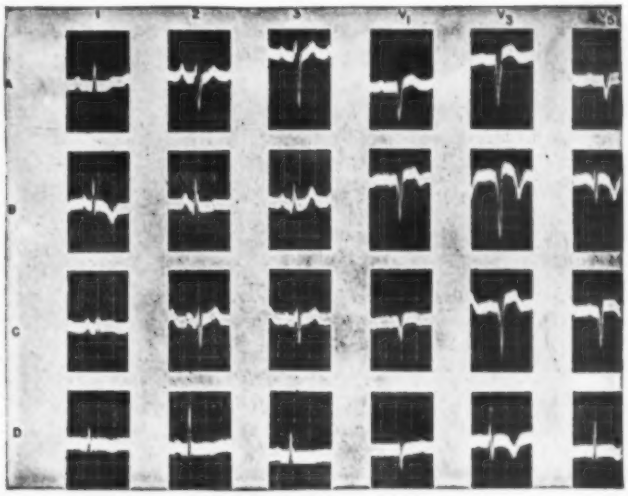
Normal Precordial Potentials, taken by the method of Wilson, Johnston, Macleod and Barker. I, II and III are the standard leads. V_1—5th rib, right sternal edge; V_2—5th rib, left parasternal line; V_4—5th rib, left midclavicular line; V_5—6th rib, left anterior axillary line; V_6—tip of ensiform. The electrodes are applied according to the recommendation of the American Heart Association.



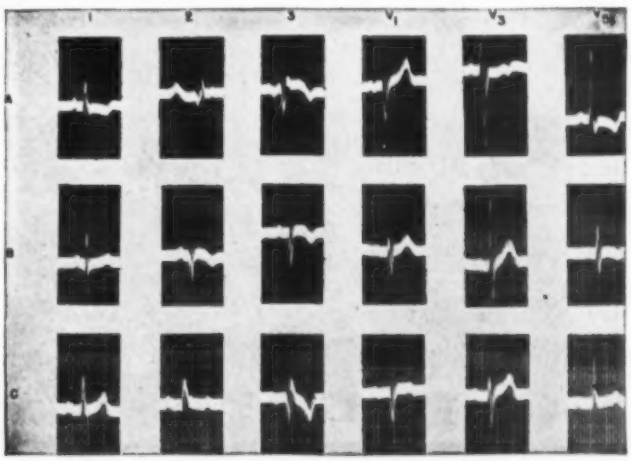
Q_1T_1 Pattern—Infarction of Anterior Left Ventricular Wall and Adjacent Interventricular Septum. Characteristic findings are (1) deep or abnormal Q wave in lead I; (2) small R wave in lead I; (3) deep S wave in leads II and III producing marked left axis deviation; (4) slight widening of QRS complex; (5) deep Q wave or absent positive deflections from chest leads over left side of precordium (V_3 and V_5); (6) elevation of the S-T segment in leads I and chest leads with reciprocal changes in lead III; (7) high take-off of T wave or inverted T waves in same Leads as elevated S-T segment.



Q_3T_3 Pattern—Infarction of Posterior Left Ventricular Wall and Basal Portion of Interventricular Septum. Characteristic findings are (1) deep or abnormal Q wave in lead III and perhaps in lead II; (2) small R wave in lead II; (3) slight widening of QRS complex; (4) normal QRS complexes in the chest or precordial leads; (5) elevation of the S-T segment in lead III and depression in leads I and in chest or precordial leads; (6) high take-off of T wave or inverted T waves in lead III and occasionally in lead II. T waves may be inverted in leads taken from the precordium.



Four Examples of Atypical Q_1T_1 Patterns.



Examples of Electrocardiograms Indicative of Posterior Wall Infarction, Q_3T_3 Pattern. The QRS complexes of the precordial leads are usually normal. The T wave may be inverted in V_5.

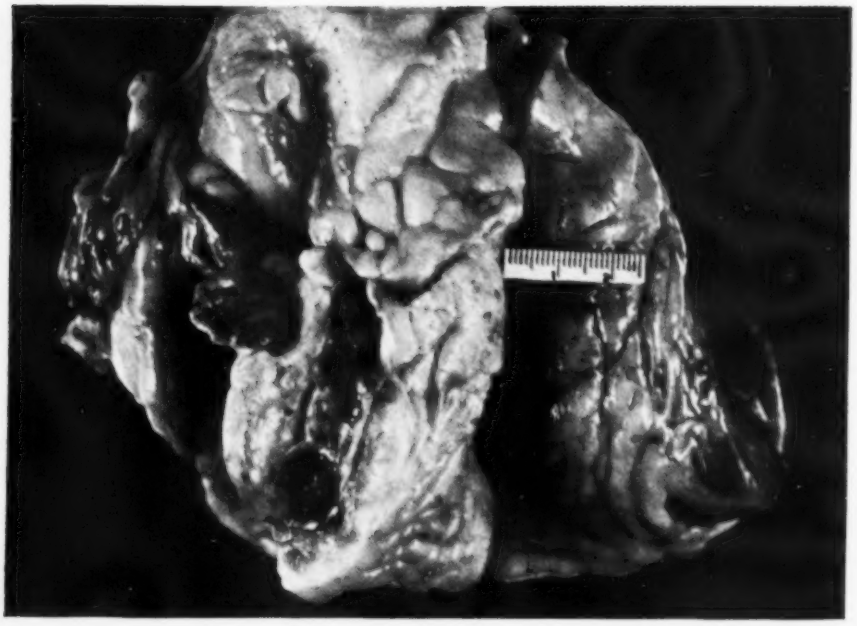
Arteriosclerotic Heart Disease (Con't.)

Arteriosclerotic heart disease is assuming increasing importance in industry because of the present necessity of employing men in the older age groups. Its importance is further emphasized by the frequency with which men of the executive class are killed or disabled by coronary arteriosclerosis. A considerable degree of sclerosis may exist without producing electrocardiographic or clinical changes, so that a coronary thrombosis may occur with little or no warning. Following coronary thrombosis it is usually inadvisable for the employee to return to work in less than six months and even at that time his return should be contingent on complete absence of signs of myocardial failure and return of the electrocardiogram to normal or at least to a well stabilized condition. Persons who have had a coronary thrombosis should not return to the more strenuous types of work and should not be placed in positions where the recurrence of the condition might expose others to danger.

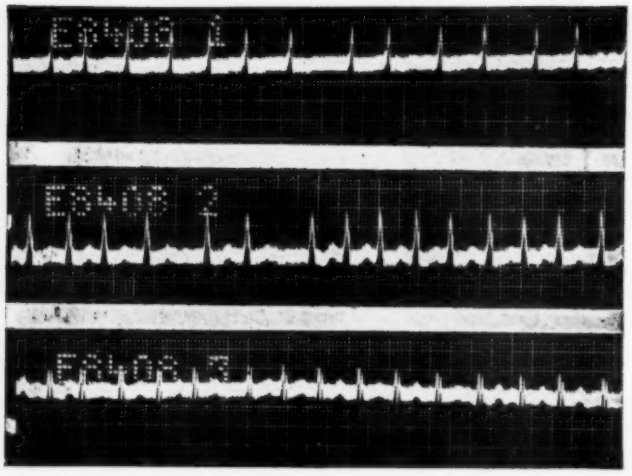
LEFT:
Arteriosclerotic Heart Disease with Hypertension.
Hypertrophy of left ventricle; marked atherosclerosis of aorta.
Male, white, age 55; death in hospital from cerebral hemorrhage.

Arteriosclerotic Heart Disease (Continued)

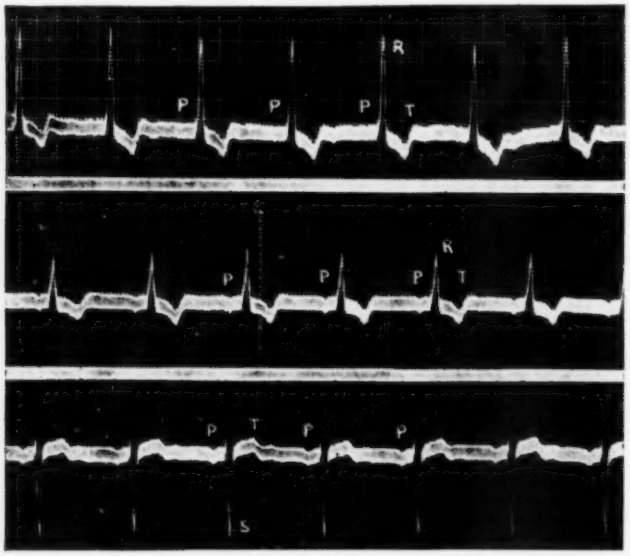
UNLESS acute myocardial damage occurs, the electrocardiogram is not typical of arteriosclerosis. Progressive myocardial fibrosis results in alteration of the T waves, slurring of the QRS complex, and, in the advanced stage, disturbances in the basic functions of the heart. Premature beats, auricular fibrillation and various stages of heart block involving the junctional tissues as well as the ramifications of the conducting system are common.



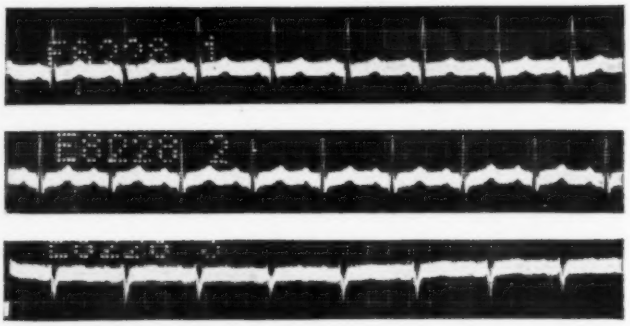
RIGHT:
Arteriosclerotic Heart Disease.
Coronary Arteriosclerosis.
Coronary occlusion with thrombosis.
Note fresh thrombus in right coronary 3 cm. from its origin.
Male, white, age 44; sudden death while driving automobile.



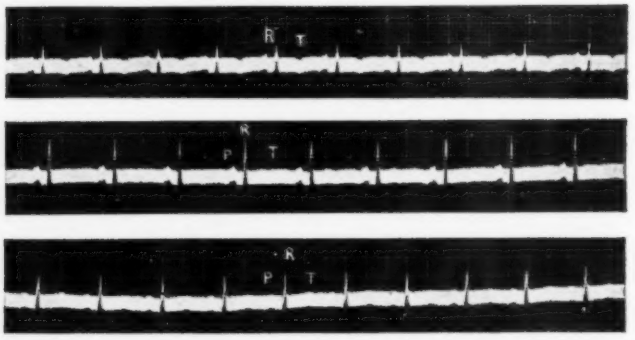
Auricular Fibrillation. Arteriosclerotic heart disease is responsible for approximately 30% of patients with this arrhythmia.



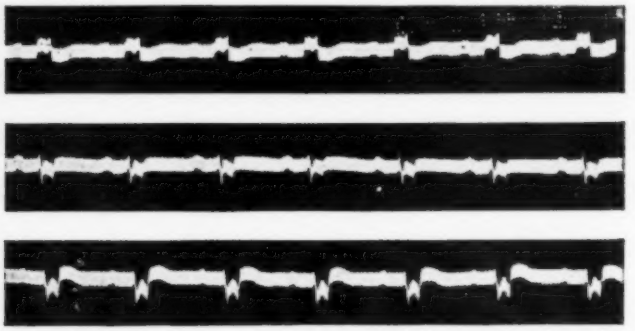
A-V Nodal Rhythm. Note inverted P waves in leads II and III. High voltage, left axis deviation and abnormal T waves indicate left ventricular hypertrophy.



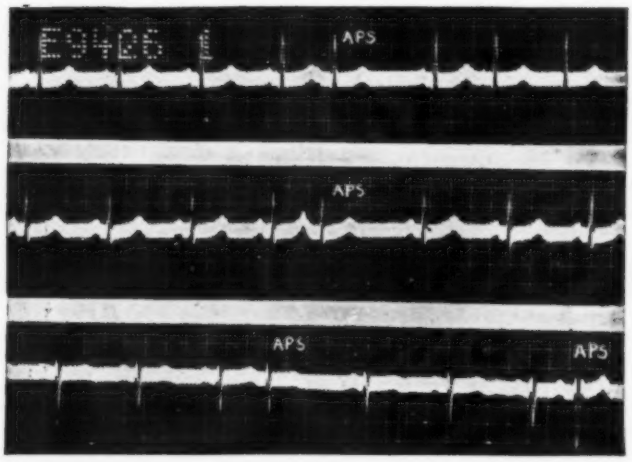
Arteriosclerotic Heart Disease. Normal electrocardiogram. Left axis deviation.



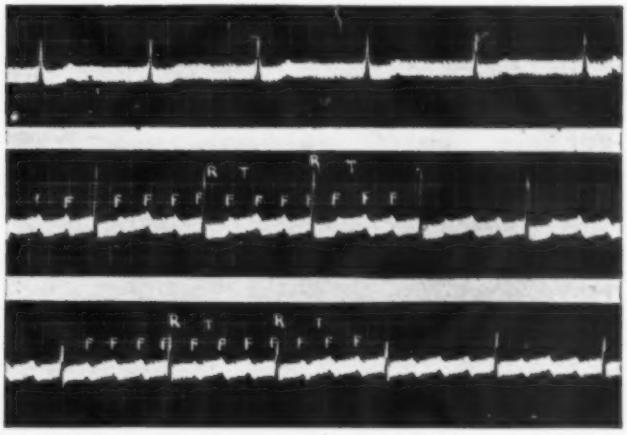
Abnormal T Waves as the only indication of myocardial disease.



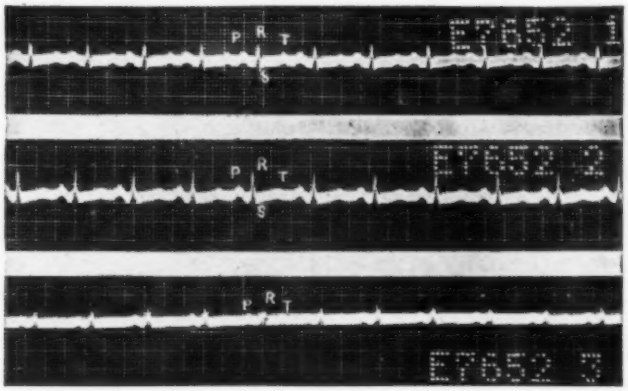
Arteriosclerotic Heart Disease. Low voltage, prolonged P-R interval and left bundle branch block. Indicative of extensive myocardial fibrosis.



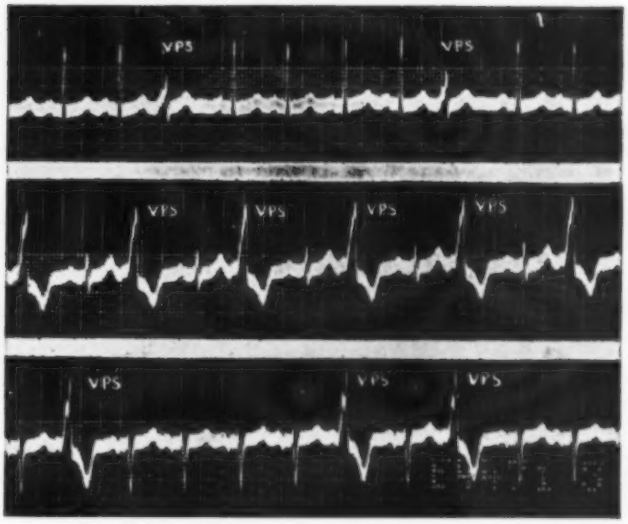
Auricular Premature Systoles. Occurs less frequently than ventricular premature systoles.



Auricular Flutter. Note 4 to 1 ventricular response—an unusual rhythm, with arteriosclerotic heart disease contributing about 6% of its incidence.



Low voltage. Frequently noted in advanced myocardial disease. Unless other electrocardiographic abnormalities are also present low voltage by itself has little significance.



Multiple Ventricular Premature Systoles. An extremely common disturbance of irritability. The premature beats may occur singly, in runs of two or three and often as illustrated in runs of coupling.

Pericarditis

Acute Fibrinous and Hemorrhagic Pericarditis.

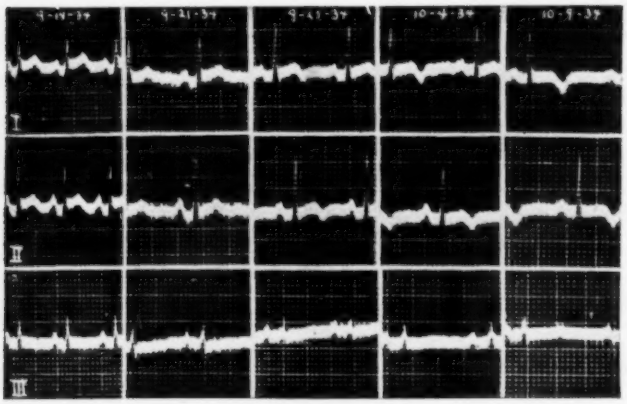
LEFT:

TYPICAL changes include elevation of the S-T segment usually in leads I and II and probably in the chest leads and abnormal T waves in the same leads. The changes resemble those seen in acute anterior myocardial infarction but differ in the absence of Q waves and in relatively normal QRS complexes. Progressive changes are the rule.

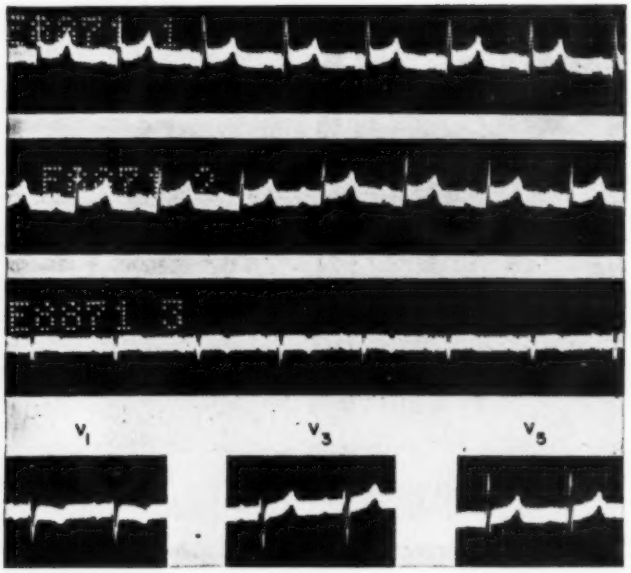
Pericarditis

PERICARDITIS is rarely seen by the industrial physician. However, electrocardiographic changes are of interest because of their superficial resemblance to those seen in coronary thrombosis. A patient who has had a serious degree of pericarditis rarely returns to full functional capacity. He is, therefore, ordinarily not employable. Constrictive pericarditis, which is not illustrated here, while a rare condition is of particular importance because of the fact that it is amenable to surgical treatment and the correct diagnosis may lead to the rehabilitation of a serious cardiac invalid. The electrocardiographic changes are not typical, and little

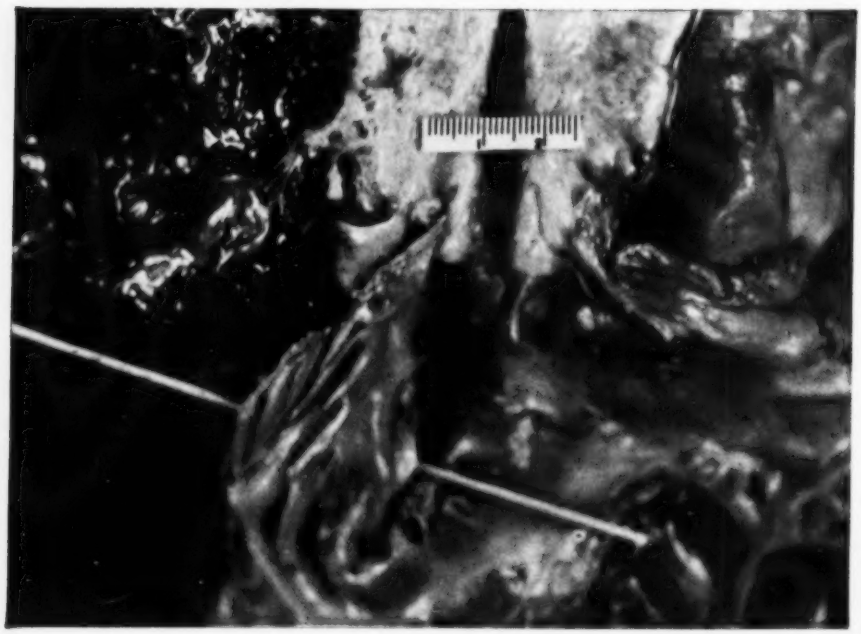
may be noted other than low voltage. The condition should be suspected, however, in the presence of anasarca which cannot be adequately explained by other causes.



Progressive changes in the electrocardiogram in a patient with acute pericarditis.



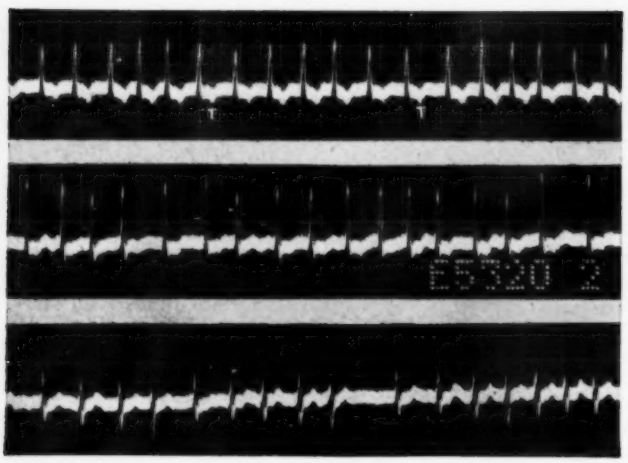
Acute Rheumatic Pericarditis. Note elevation of S-T segment in leads I and II. Precordial leads are normal.



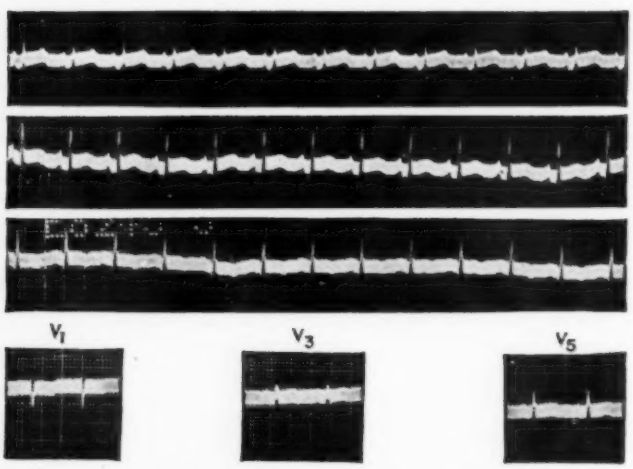
Tumors of the Heart

THIS is a condition rarely seen by the industrial physician. It may, however, be confused with cardiac disease of other types, particularly arteriosclerotic. The electrocardiogram is usually normal with primary or metastatic neoplasms of the heart. Infiltration of the pericardium may result in changes similar to those seen in acute rheumatic pericarditis. Infiltration of the auricle may produce abnormal irritable centers with disturbances in rhythm, such as paroxysmal auricular tachycardia or auricular fibrillation.

LEFT:
Metatastic Carcinoma of Right Auricle and Superior Vena Cava. Primary bronchiogenic carcinoma with metastasis to mediastinum and heart. Male, white, age 55.



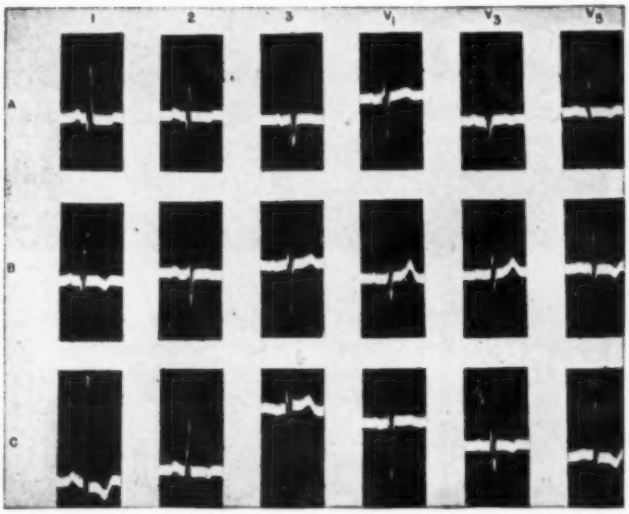
Auricular Fibrillation. Patient with primary carcinoma of myocardium.



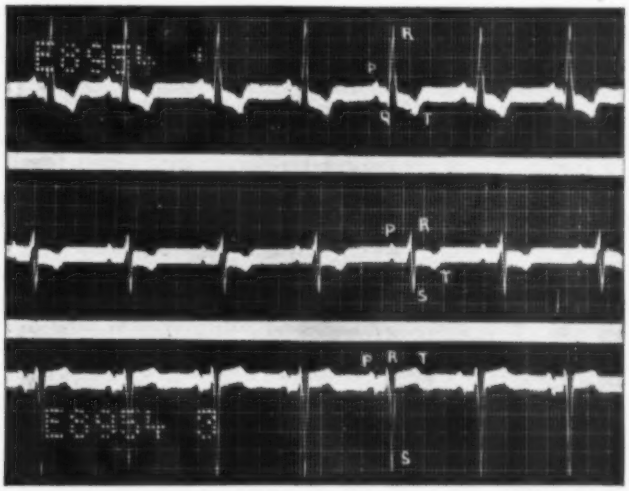
Infiltration of tumor into pericardium. Typical elevation of S-T segment leads II and III.

Hypertensive Heart Disease

HYPERTENSIVE heart disease is also assuming increasing importance to the industrial physician. Its hazards are similar to those of arteriosclerotic heart disease in that it may either lead to congestive heart failure or because of the frequently associated coronary sclerosis which may lead to coronary thrombosis. Death also may occur from non-cardiac complications, such as cerebral hemorrhage or renal failure. Sudden death with its possible danger to others and occasional claims for compensation may, therefore, result either from cardiac or cerebral causes. It is impossible to set an arbitrary standard for blood pressure for employability, but, in general, marked cardiac enlargement and well defined electrocardiographic changes other than moderate axis deviation should be causes for rejection.



Examples of Standard and Precordial Leads Associated with Left Ventricular Hypertrophy Secondary to Hypertensive Heart Disease. Similarity is found only in (1) left axis deviation (2) abnormal T waves in lead I and lead V_5 (left side of precordium), and (3) delay in development of peak of R wave lead V_5 indicative of late cessation of electrical activity (wave of excitation within the myocardium).



Marked Left Axis Deviation; Normal Sinus Rhythm. Note deep S waves in leads II and III. Abnormal T wave leads I and II.

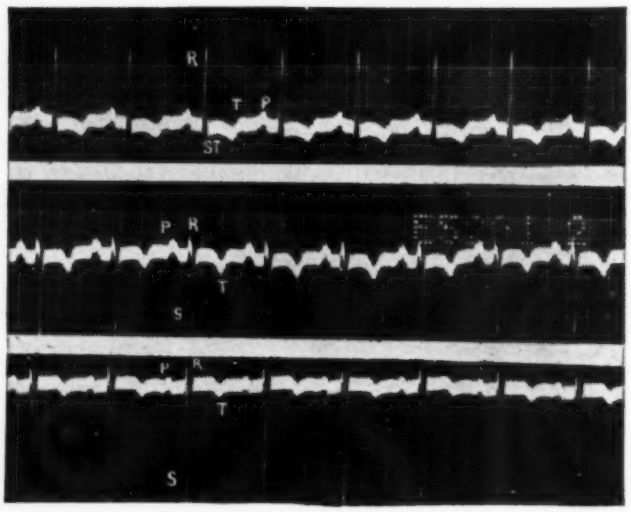
HYPERTENSION in the early stages of the disease may not alter the electrocardiogram. Eventually as left ventricular hypertrophy and dilatation occur there develops in the majority of cases left axis deviation of the QRS complex. A reciprocal deviation of the T wave is noted to the right. High voltage is common. Concomitant arteriosclerosis may result in all the changes illustrated under that disease.

RIGHT:
Hypertensive Heart Disease. Hypertrophy, Left Ventricle. Female, white, age 30, death in hospital from congestive failure. Weight of heart 520 grams.

Syphilitic Heart Disease

SYPHILITIC heart disease, as illustrated by the case presented, may result in sudden death. This is a sufficiently frequent complication to cause one to reject such patients for employment. If the disease has progressed to such a point that there are changes in the electrocardiogram, it is unquestionably a definite contra-indication. In many cases, however, the diagnosis may be extremely difficult to make and requires the aid of fluoroscopic and x-ray examinations.

UNLESS aortic insufficiency of long standing or coronary osteal stenosis is present, the electrocardiogram may not be abnormal. The former results in left ventricular hypertrophy so that the electrocardiogram resembles those found in hypertensive heart disease. Coronary osteal stenosis may produce changes that are indistinguishable from those seen in arteriosclerotic heart disease.



ABOVE:
Patient with aortic insufficiency; regular sinus rhythm; marked left axis deviation. Note similarity to tracings illustrating hypertensive heart disease.

LEFT
Syphilitic Aortitis—Diffuse Form.
Note fine wrinkling and crenations over entire aorta; right coronary slightly stenosed by sclerotic process. Sudden death at home, male, white, age 49.

IN NO BRANCH of medicine is prognosis more difficult than in cardiac disease. The industrial physician is placed in the dilemma of either unnecessarily rejecting a person capable of a long period of useful work or, on the other hand, of approving the employment of one who may die or be disabled within a very short time. While it is impossible to be infallible in such decisions, consideration of the clinical, x-ray, and electrocardiographic findings, enables the physician to make a fairly accurate evaluation in the majority of cases. Industry must assume certain risks in employing those with known abnormalities, but these are justifiable in many cases.

The physician should be expected to indicate what chances may justifiably be taken in fairness to all concerned but should not be blamed if, in the individual case, his prognosis is found to be incorrect.

[NOTE: The Kodachrome transparencies and fresh pathology are from the Laboratory of the Chief Medical Examiner of Essex County, HARRISON S. MARTLAND, M.D., Newark, New Jersey.

The electrocardiograms identified by the numerical perforations are used through the permission of the American Heart Association and DR. ARTHUR C. DEGRAFF.

We are indebted to DR. ROBERT C. BATTERMAN, Assistant Chief, Cardiac Clinic of New York University, Department of Therapeutics, New York University, Bellevue Hospital, New York City, for his assistance in interpreting and preparing the electrocardiograms.]

Evaluation of the Cardiac Patient in Industry

PRE-PLACEMENT examinations during the present industrial manpower shortage must go beyond the simple determination that the applicant has a cardiac abnormality. People with mild degrees of cardiac disability constitute a large reservoir of valuable manpower for industry which may be called upon with profit to the industry concerned and benefit to the employee if certain criteria are employed in the selection of the worker and of the work he is to do.

There are three considerations which the industrial physician must keep in mind:

1. Can the prospective employee do useful work without endangering his own health?
2. Is he subject to syncope or sudden death, which might endanger fellow employees?
3. May he be employed without making the employer liable to claims for compensation resulting from aggravation of his condition while on the job?

No single diagnostic procedure is adequate to answer these questions and even with all means at our command it may be impossible to give an accurate prognosis in the individual case. However, by consideration of certain general principles and application of modern methods of investigation, it is usually possible to place the man at work without undue risk. Special considerations which relate to specific types of heart disease or manifestations of it will be discussed in greater detail later. However, it is advisable, first, to evaluate the various diagnostic procedures at our command. The history, of course, is of great value if it can be obtained with any degree of accuracy. This is difficult, however, in industrial work because, before he is employed, the applicant generally conceals or minimizes the degree of his disability. If it can be determined, however, in what job or activity the applicant was last engaged and whether this was carried out without difficulty, the information is of considerable value. In general, a man who has been able to carry out full activities without discomfort or difficulty can continue to do so for an indefinite period unless intercurrent disease or acute or active recurrence of the original cause of his heart damage has taken place.

On physical examination other findings are often more important than those made on direct auscultation of the heart itself. Any degree of dyspnea at rest may usually be considered a contra-indication to employment. Cyanosis also usually has similar significance. The signs of congestive failure, such as moist rales at the lung bases, enlargement of the liver and peripheral edema, unless the latter is due to local causes such as varicosities, usually disqualify the applicant for work.

It is when we come to examination of the heart itself and find that it is slightly enlarged or that an arrhythmia or murmurs are present, or when we find that the blood pressure is somewhat elevated, that there is room for question as to the disposition of the case.

One simple aid in determining this point which can be carried out in the routine examination is the use of an exercise tolerance test. The exact nature of the exercise is not particularly important so long as it is standardized. The general practice is to determine the pulse rate before and after the exercise and two minutes later. It is usually assumed that the heart rate normally returns to its original level in two minutes. This is, perhaps, not universally true, but if the pulse remains unduly elevated, there are definite grounds for suspicion. It is even more important, however, to observe the patient during the performance of the exercise test and immediately thereafter and to note whether dyspnea or cyanosis is elicited. If the applicant is unable to perform the usual exercise test without showing definite dyspnea, it may be assumed that he is unfitted for any but sedentary or very light work.

The size and contour of the heart are among the most important considerations in determining its organic and functional status. Even though murmurs may be present which clearly denote organic cardiac disease, it may generally be assumed that this is well compensated if the heart is not enlarged and is of normal contour. In determining this point, simple physical examination frequently is not adequate and we must depend upon the x-ray. One must not be misled by an impression of hypertrophy due merely to a transverse position of the heart which is often seen in persons of stocky build. Accurate measurements should be made and correlated with the internal diameter of the chest. Even in the absence of increase in total diameter, however, an abnormal contour may give definite evidence of a significant degree of heart disease. This should be investigated further by means of fluoroscopy and films in lateral and oblique positions. These are particularly necessary if dilatation of the aorta is suspected, as it is frequently impossible to diagnose this accurately from a single A-P view. In hypertensive cardiovascular disease the size of the heart is one of the best indices of the duration of the disease and the degree of cardiac damage. In general, the applicant with clear-cut ventricular hypertrophy whether due to valvular, hypertensive or arteriosclerotic disease is unsuitable for any but sedentary work.

No examination of a person with suspected heart disease is complete without an electrocardiogram. However, this means of examination alone should not be looked to for a definitive answer in determining employability. Its greatest field of usefulness is in the accurate diagnosis of the arrhythmias, in following the course of a patient with coronary thrombosis, and as an aid in the evaluation of the hypertensive heart. The industrial point of view towards these particular cardiac disorders will be discussed in greater detail later on.

Studies of the vital capacity and maximum breathing capacity may give much useful information. Recently such studies have been instituted on a large scale and certain definite criteria may now be considered established. To make the necessary measurements requires a specially designed spirometer. As this form of examination is not yet commonly used and understood, perhaps it is desirable to discuss it in some detail.

In the performance of the test, the subject is allowed a preliminary period of adjustment. The record thus obtained while breathing normally indicates the tidal volume. He is then asked to take the maximum inspiration which is possible. This gives the complemental air (normally from 58 to 75% of vital capacity). Following this a maximum expiration indicates the vital capacity. The distance of the maximum expiration below the usual tidal expiration measures the reserve air (normally 25 to 42% of vital capacity). The vital capacity is normally proportional to the total body surface which can be derived from the height and weight by the use of suitable tables. The absolute figures are of little value but the percentage which the observed vital capacity is of the calculated normal, has definite significance.

Another very useful measurement is that of the maximum breathing capacity. This is usually determined, following measurement of the vital capacity, by having the subject breath as rapidly and deeply as

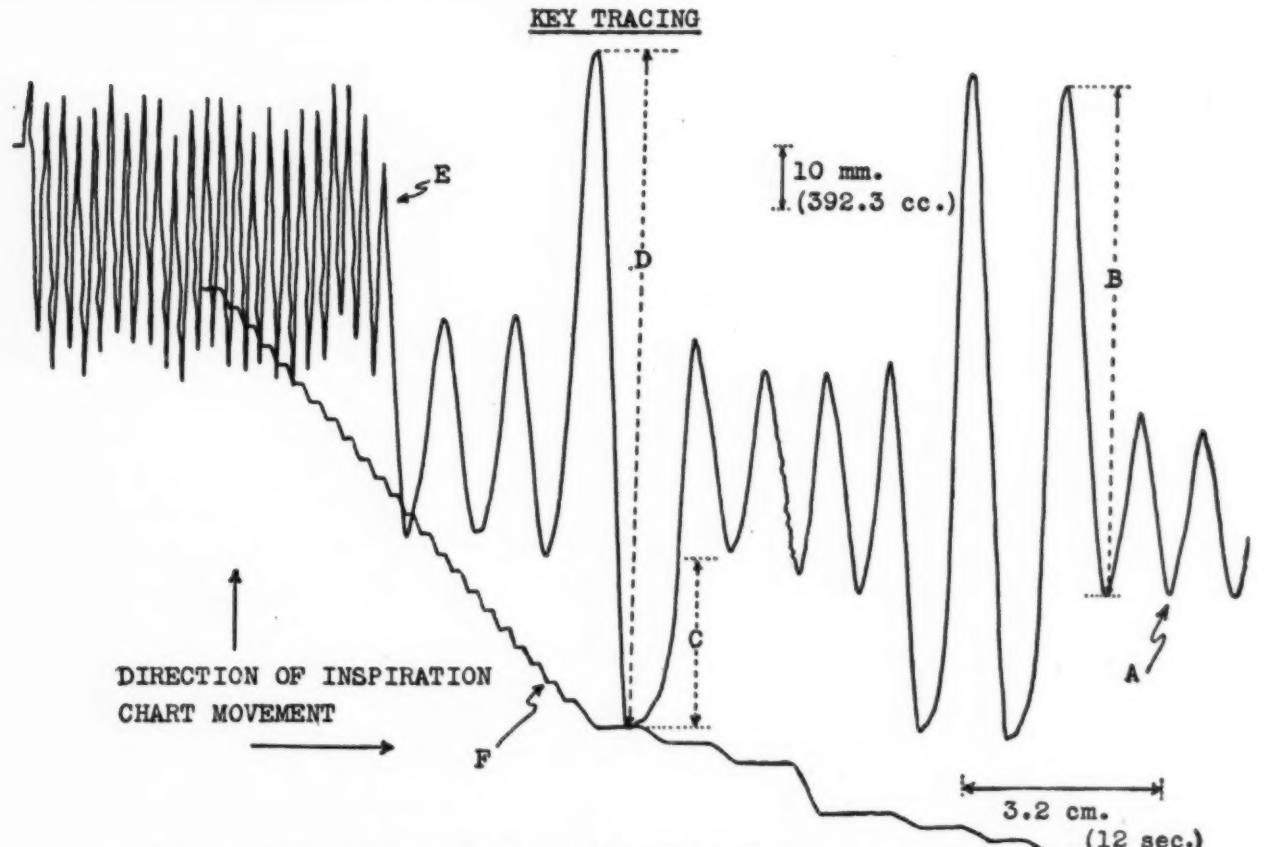
possible. The rate of air exchange, normally from 80 to 150 liters per minute, is an excellent measure of cardio-respiratory efficiency. In both cardiac and respiratory disease, if there is any degree of decompensation, both vital capacity and maximum breathing capacity will be appreciably diminished. It is frequently possible to differentiate dyspnea of pulmonary from that of cardiac origin by observing the shape and characteristics of the curves obtained on the spirometer. In the presence of pulmonary fibrosis and bronchial narrowing due either to spasm or structural change, the time necessary for complete expiration is prolonged and the reserve air may be greatly diminished or almost entirely absent. In performing the maximum breathing test in such conditions, in addition to diminution of air exchange, it is usually noted that the shallow respiratory excursions are carried out with the lungs almost fully inflated. In simple cardiac decompensation on the other hand, although there may be an equal diminution of vital capacity and maximum breathing, one may not see the prolongation of the expiratory effort. The diminution of the vital capacity may be seen both in the reserve and complemental air. While maximum breathing capacity is impaired it is usually carried out in comparatively normal respiratory phases.

Normal standards are not as well established as might be desired, but it may safely be said that a person whose vital capacity and maximum breathing are diminished to below 50 to 60% of the normal for his height and weight may be considered unsuitable for work involving physical exertion. In general the prognosis of a cardiac patient with low vital capacity is less favorable than if similar diminution is due to chronic pulmonary disease. This method of investigation is well adapted to following the course of the subject under treatment or to determining the effect of working conditions on his cardiac or pulmonary status.

Specific Types of Cardiac Disease

ONE of the most important factors influencing our attitude towards specific types of cardiac disease is whether or not the disorder may cause sudden death or syncope. This obviously in most industries may be a source of danger both to the workman in question and to his fellows. Also, sudden death or incapacitation while on the job, even though it may be due to pre-existing disease, always raises the question of compensation awards.

The etiology of cardiac disease is as important in this respect as the findings on examination. It is well



A. TIDAL BREATHING (NORMAL RESPIRATORY EFFORT)

B. COMPLEMENTAL AIR (MAXIMUM POSSIBLE INSPIRATION AFTER TIDAL EXPIRATION)

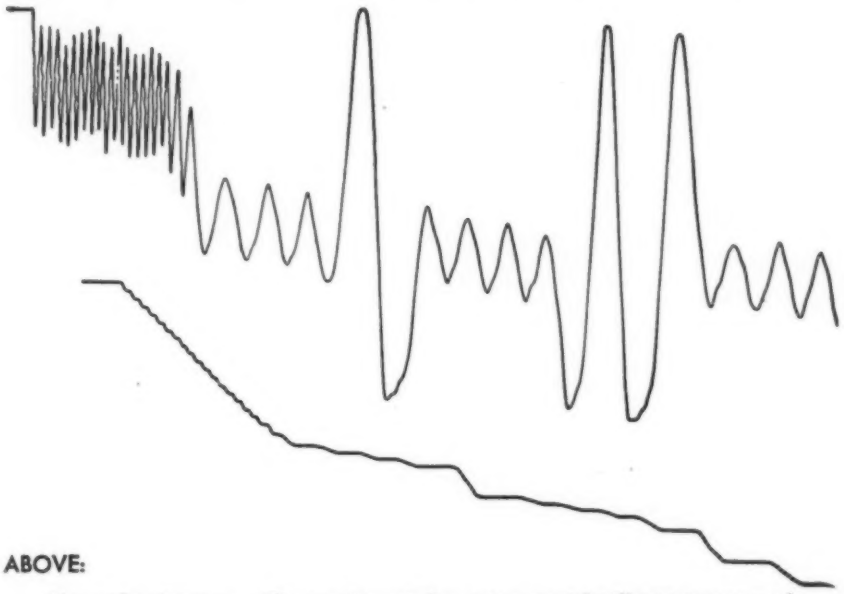
C. RESERVE AIR (MAXIMUM POSSIBLE EXPIRATION AFTER TIDAL EXPIRATION)

D. VITAL CAPACITY (TOTAL MECHANICAL CAPACITY)

E. M.B.C. (MAXIMUM BREATHING CAPACITY)

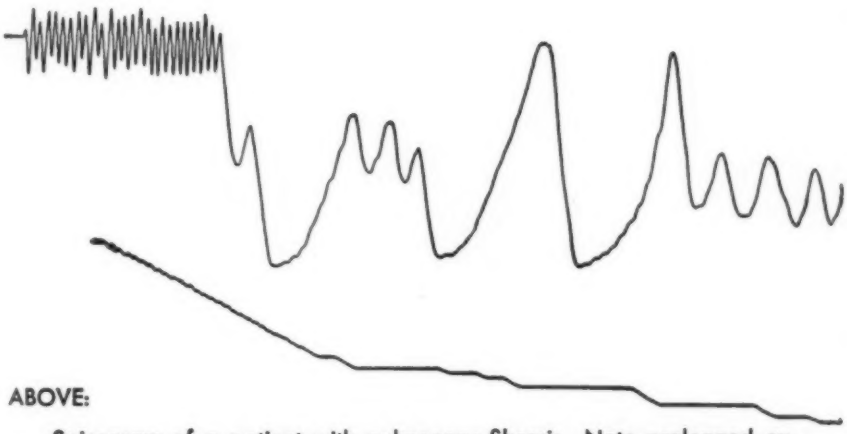
F. VENTILOGRAPH M.B.C. (REDUCTION FACTOR 1/12)

known that those with considerable degrees of hypertension are particularly subject to coronary thrombosis and its attendant danger of sudden death or disability. It is impossible to lay down any hard and fast rule as to what level of blood pressure constitutes a contra-indication to physical labor. In general, a person with a blood pressure over 180 systolic or 110 diastolic would be considered unsuitable for manual labor. On pre-employment examinations the pressure, particularly the systolic pressure, may be somewhat elevated because of nervousness. However, it rarely exceeds 150 or 160 under such circumstances unless there is some pre-existing hypertension. If the hypertensive shows considerable cardiac enlargement, if he is at all dyspneic, or if there are signficant T wave changes in the electrocardiogram, he should probably be considered unsuitable regardless of the blood pressure level. Left axis deviation is such a frequent electrocardiographic finding, particularly in those of middle age or over, that, unless it is of considerable degree, it may be disregarded.



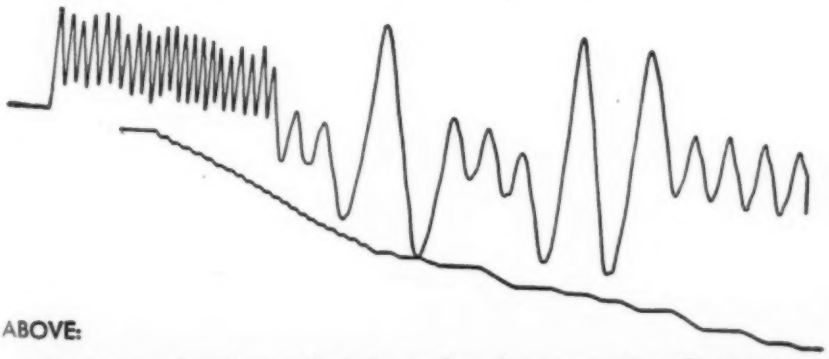
ABOVE:

Normal spirogram. The tracing at the extreme right illustrates normal or tidal breathing. The adjacent large excursions are the maximum which the patient is capable of and give the vital capacity. Tracing at extreme left is the maximum breathing capacity, this is measured by the lower line, the slope of which indicates the volume breathed per minute.



ABOVE:

Spirogram of a patient with pulmonary fibrosis. Note prolonged expiratory effort, diminished vital capacity, diminished maximum breathing and maximum breathing effort in position of inspiration.



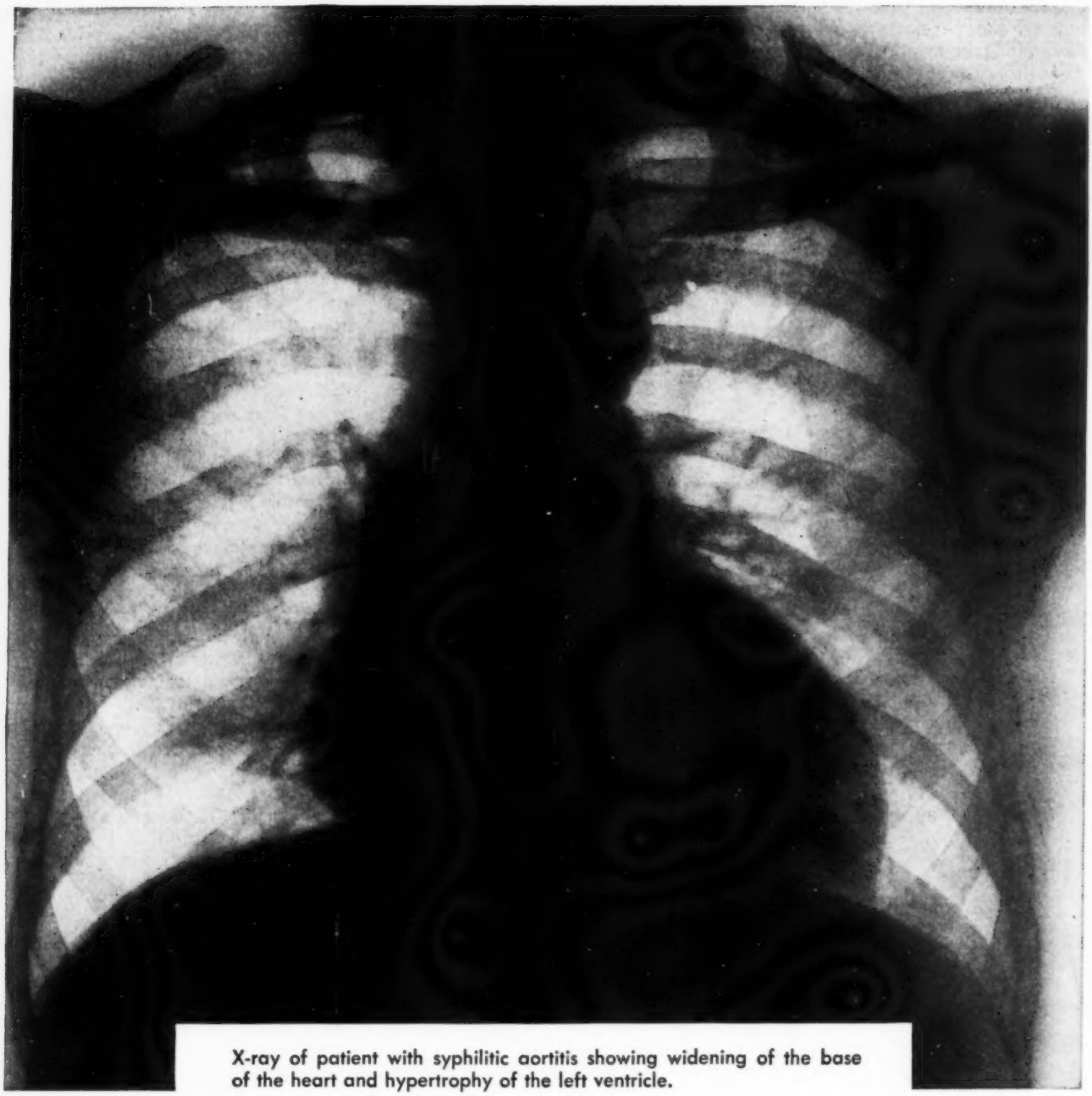
ABOVE:

Spirogram of patient with slight cardiac decompensation. Tracing is normal in contour but vital capacity and maximum breathing are somewhat diminished.

Arteriosclerotic heart disease is perhaps the most difficult type to evaluate. If the applicant gives a history of anginal attacks or if there is sufficient myocardial damage to result in any signs of decompensation, he is not suitable for employment. However, it is well known that a person may have a considerable degree of sclerosis of the coronary arteries without exhibiting any physical signs or symptoms or showing electrocardiographic or x-ray evidence of his condition. Such a person is, of course, a candidate for coronary thrombosis, but there is at present no way of determining this in advance and industry must accept this risk, particularly if men in the older age groups are to be employed.

An extremely difficult problem is presented by the employee who has had coronary thrombosis and asks to be reinstated in his job. There is no question that in some instances there may be almost complete recovery. However, it is probably advisable that such a person should do only sedentary or very light work. He should not be returned to work until there are no physical signs of cardiac disability and the electrocardiogram has reached a stabilized condition and shows only minimal signs of myocardial damage. In general, a person who has had coronary thrombosis should not return to work in less than four to six months and his return to activity should be gradual. Frequent supervision is desirable in such cases with physical examinations, electrocardiograms, x-rays and fluoroscopy at regular intervals.

Syphilitic heart disease, if it has reached a detectable stage, should be considered a contra-indication to physical labor. Any person with this condition may have narrowing

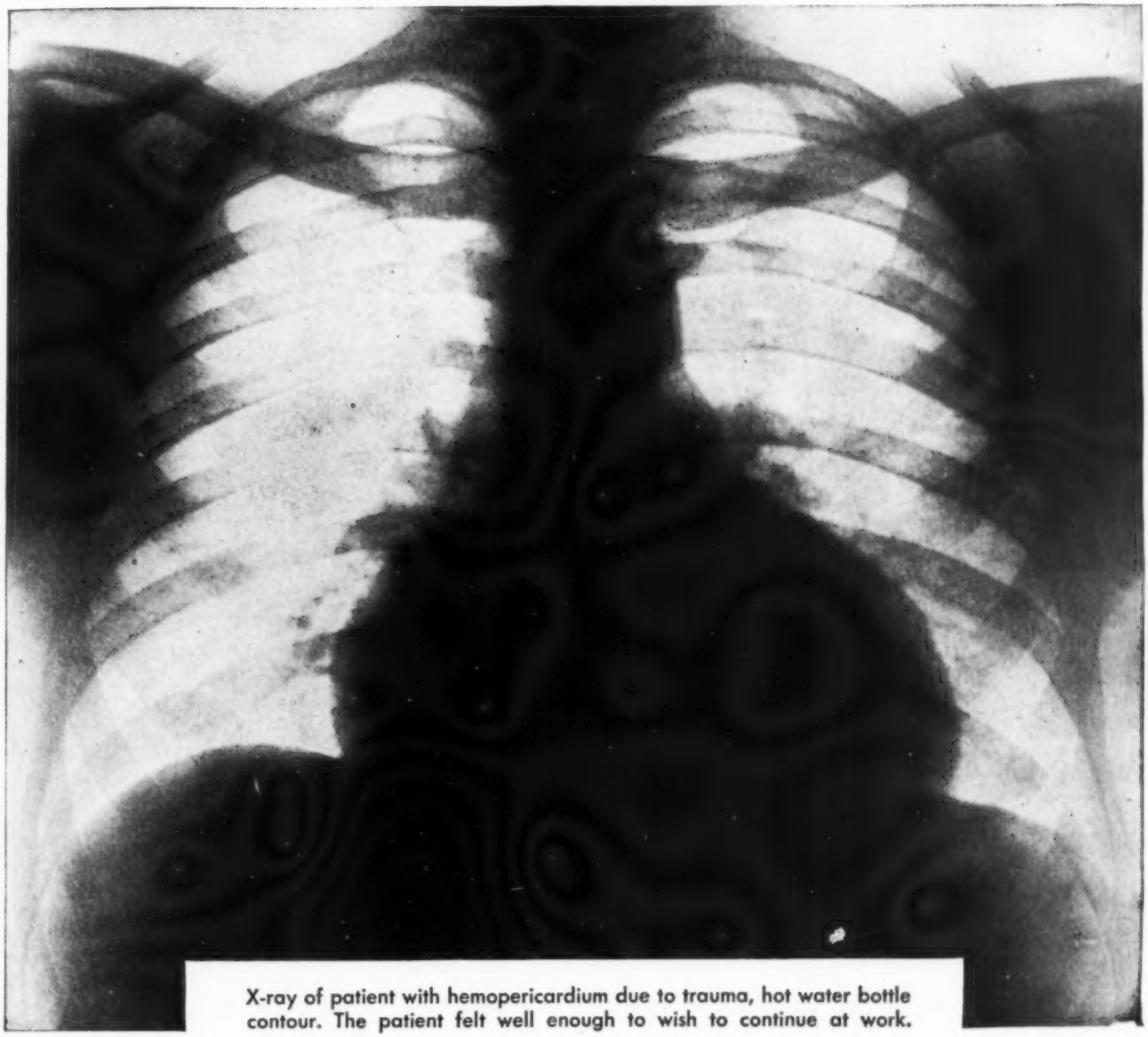


X-ray of patient with syphilitic aortitis showing widening of the base of the heart and hypertrophy of the left ventricle.

of the coronary ostia and may die suddenly or become unconscious. If the applicant is known to have a positive Wassermann, particular care is necessary in examining the cardiovascular system. In such cases there may be no dyspnea on exertion and the applicant may appear to be in excellent physical condition. However, if there is an aortic diastolic murmur or even an alteration in the character of the heart sounds in the aortic area, he should be rejected. X-ray and fluoroscopic examination is probably, however, the most valuable type of investigation in such cases. Here one must look for hypertrophy of the left ventricle and signs of aortic dilatation. In searching for the latter, a simple A-P film is not sufficient. Lateral and oblique views and fluoroscopy are essential for the diagnosis in most cases.

An established aneurism, of course, is an absolute contra-indication to employment.

In contrast to the two preceding types of heart disease (in which the tendency is to miss the diagnosis and employ persons who should be rejected), in rheumatic heart disease, applicants are frequently turned down who are capable of long periods of useful activity. The mere presence of an organic heart murmur of rheumatic origin is no contra-indication to employment. Decompensation, patricularly in those with mitral valve disease, is usually of comparatively gradual onset and may usually be detected before any serious hazard has been incurred. Sudden death, while it may occur, is the exception in rheumatic cases. If the applicant with a history of rheumatic fever or with definite mitral murmurs is not dyspneic on exertion, has regular rhythm, and has no significant cardiac enlargement, he may be safely employed for any but the more strenuous types of physical activity. The x-ray in such cases will frequently show some straightening of the left border of the heart but unless there is definite ventricular hypertrophy, this need not necessarily be a contra-indication to employment. However, it is an indication for periodic check-ups. The electrocardiogram is usually of little help in evaluating cases of rheumatic fever. Its most important function is in diagnosing arrhythmias if they complicate this disorder and in aiding in the detection of active rheu-



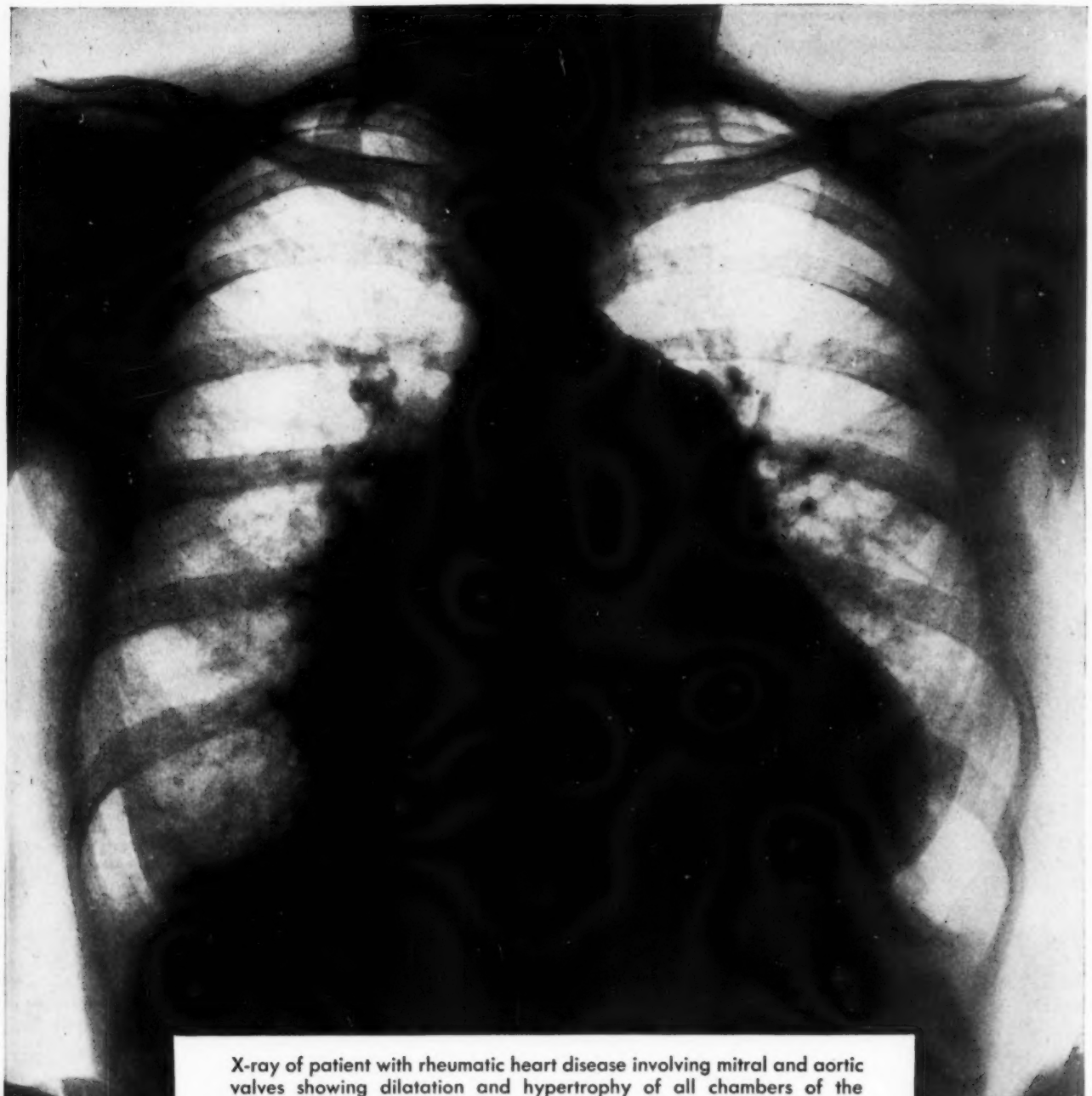
X-ray of patient with hemopericardium due to trauma, hot water bottle contour. The patient felt well enough to wish to continue at work.

matic carditis. All cases in which a diagnosis of rheumatic heart disease is made should have a white blood count, sedimentation rate and electrocardiogram. If the white count or sedimentation rate is elevated, if there is any degree of fever, or if the electrocardiogram shows prolonged AV conduction time, or alterations in the QRS or T waves, the presence of active rheumatic fever should be suspected and the applicant barred from employment. However, after an adequate period of rest and therapy, if these determinations return to normal, and there are no signs of decompensation as mentioned above, such a person may be suitable for employment under medical supervision.

Persons with any definite manifestations of heart disease due to thyrotoxicosis, such as cardiac hypertrophy, auricular fibrillation, or any signs of decompensation, are not employable. However, such conditions may be reversible if they have not persisted for too long a time and, after suitable operative treatment, the applicant may again be considered.

Congenital heart disease is rarely much of a problem to the industrial physician. If the applicant has survived to an employable age and is not a definite cardiac invalid, the condition may be considered comparatively mild and the prognosis good for several years of normal activity. Cyanosis or dyspnea at rest or slight exertion is, as in other types of heart disease, a contra-indication to employment. The mere presence of a murmur of congenital origin however, need not be so considered. It is true that anyone with congenital heart disease, as well as those with valvular damage due to rheumatic fever, may at any time develop bacterial endocarditis. This, however, does not cause sudden incapacitation and could hardly be confused with any disorder of occupational origin. It should be mentioned in connection with congenital heart disease, that clubbing of the fingers is not necessarily any indication of this or any other cardiac disorder. Several cases have been observed in which there was no demonstrable etiology for this condition. In spite of this fact, there have been instances in which such persons have been excluded from employment merely because of clubbing of unknown etiology. If there is no cardiac or pulmonary disease sufficient to be diagnosed by any other means, clubbing in itself is of little significance.

The arrhythmias and certain types of electrocardiographic abnormalities may not only be encountered in the presence of heart disease due to various etiologic agents but at times even in the absence of demonstrable organic heart disease. They are, however, so readily detectable as a rule and frequently so alarming to the patient that they are often brought to the attention of the industrial physician. Probably the

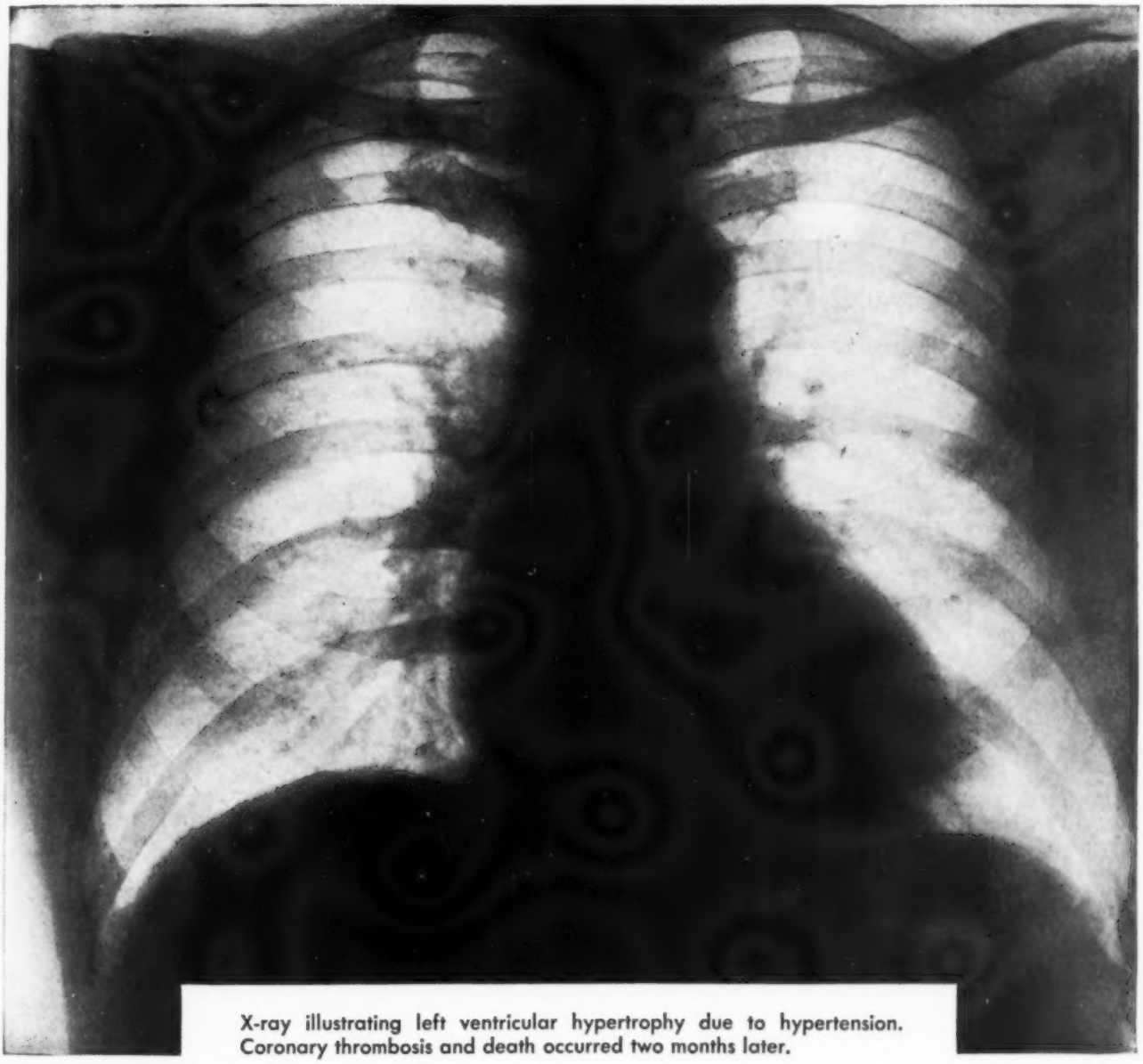


X-ray of patient with rheumatic heart disease involving mitral and aortic valves showing dilatation and hypertrophy of all chambers of the heart. This patient gave no cardiac history and was an applicant for employment.

most common arrhythmia is ventricular extrasystoles. In the younger age groups in the absence of other heart disease, these may be disregarded and the employee given reassurance. A history of sudden onset of extrasystoles, however, in those of middle age or beyond may be the first evidence of coronary artery disease. It, therefore, should be an indication for thorough cardiac investigation and, as a rule, some limitation of activity. Extrasystoles of auricular origin are also usually innocuous but may occasionally be the precursors of auricular fibrillation. They should, therefore, be regarded with somewhat more suspicion and are an indication for periodic check-ups.

Simple tachycardia is usually a sign of neurocirculatory instability but in the absence of other indications does not usually mean that organic heart disease is present. Industry is now receiving many such cases which have been turned down for military service. While not adaptable to the stress of warfare, such persons are ordinarily employable. It is most important to emphasize to the applicant that he has no organic heart disease and may engage in normal activity. Bradycardia, even with a pulse rate under 50, is compatible with excellent physical condition and is indeed seen frequently in highly trained athletes. It must, however, be distinguished from complete heart block, which may only be done by means of electrocardiographic examination. Heart block is a complete contra-indication to employment, as it may be associated with Stokes-Adams syndrome and periods of sudden unconsciousness.

Paroxysmal tachycardia, although temporarily incapacitating, is ordinarily a benign condition and does not contra-indicate employment at any type of work. In certain cases paroxysmal tachycardia may be associated with the electrocardiographic finding of widened QRS complexes and shortened PR interval. This syndrome, which has been recognized in recent years, does not apparently indicate organic heart disease and is no contra-indication to physical exertion. In the absence



X-ray illustrating left ventricular hypertrophy due to hypertension. Coronary thrombosis and death occurred two months later.

of this syndrome, bundle branch block or delayed intraventricular conduction is ordinarily an indication of serious organic heart disease. Occasionally, however, on routine electrocardiograms this condition may be found in persons with no history of heart disease and no other abnormal findings. Such cases require the most careful investigation with all means at our command, but if no other abnormality is found, the condition may be considered to be probably benign and not a contra-indication to normal activity. This is particularly the case in the younger age groups. In persons past middle age, even though there is no positive history or other abnormal findings, bundle branch block is most apt to be the result of arteriosclerotic heart disease and as such may be considered a contra-indication to physical exertion. It is true that in some such instances, the condition may have been present from early life but unless this is known to be the case, it is best to err on the side of conservatism.

Auricular fibrillation is usually an indication of at least moderately severe organic heart disease and as such is a bar to any activity involving physical exertion. It also carries the added hazard of embolic phenomena which may in themselves be a cause of sudden death or syncope. However, certain individuals, if under adequate medical supervision may do light work for many years even though fibrillation is present. If the ventricular rate remains below 90, either spontaneously or because of adequate digitalization, the functional capacity of the heart may be remarkably good and allow a person to lead a useful although not strenuous life.

Auricular flutter has very much the same significance as fibrillation although it is usually a more acute condition and in many cases eventually develops into fibrillation. It may be considered a contra-indication to employment.

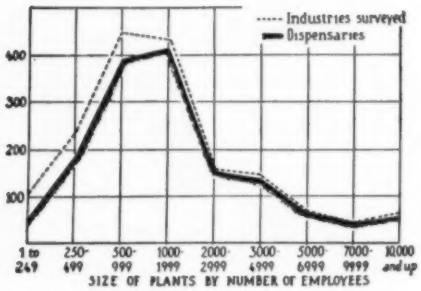
From the preceding statements, it may appear that the majority of cases of heart disease should be rejected for employment. However, very few applicants fall into the more severe classifications which have been discussed. Most workers examined by the industrial physician either have functional murmurs, benign arrhythmias, or the milder degrees of organic cardiac disease. Most of these can be placed at some type of light or moderately strenuous work and in many instances no restriction at all will be necessary.

The aim of the industrial physician must be twofold: To exclude those who would be injured by work, but at the same time not to create cardiac invalids unnecessarily by relegating potentially useful workers to the classification of the unemployable.

American College of Surgeons

MEDICAL SERVICES IN INDUSTRY

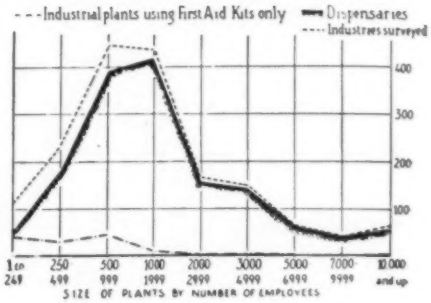
NUMBER OF INDUSTRIAL COMPANIES SURVEYED AND NUMBER OF DISPENSARIES



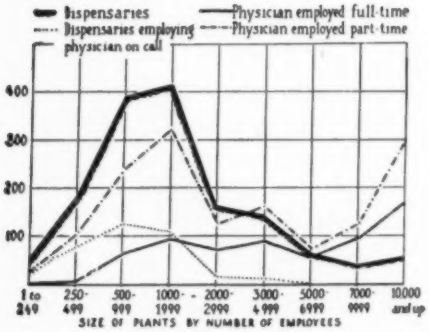
TOTALS

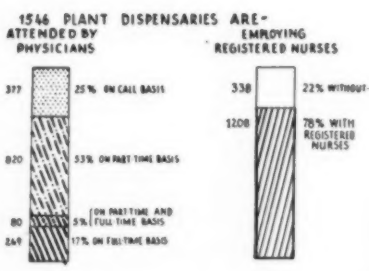
Industrial companies surveyed	1715
Plants having dispensaries	1546
Plants using First Aid Kits only	149
Dispensaries having physicians on call	377
Physicians employed part-time	1485
Physicians employed full-time	670
Registered Nurses employed	2592

NUMBER OF INDUSTRIAL COMPANIES, DISPENSARIES, AND NUMBER OF COMPANIES USING FIRST AID KITS ONLY

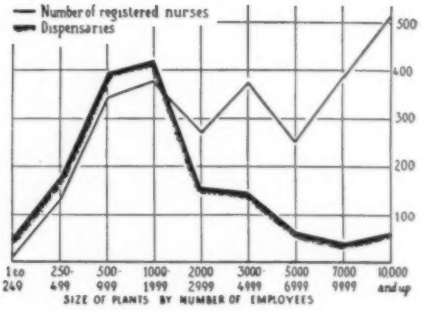


EMPLOYMENT OF PHYSICIANS



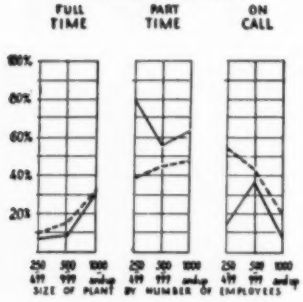


EMPLOYMENT OF REGISTERED NURSES

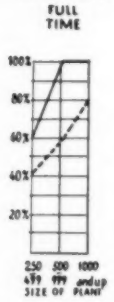


COMPARISON OF MEDICAL SERVICES IN INDUSTRY SURVEY OF 1929-1940 WITH SURVEY OF 1941-1942

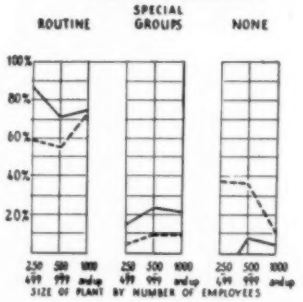
PHYSICIANS IN INDUSTRY



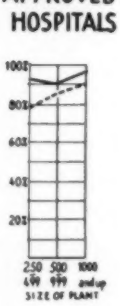
REGISTERED NURSES



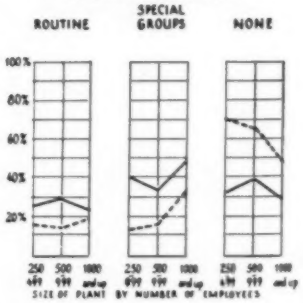
PREPLACEMENT PHYSICAL EXAMINATIONS



USE OF APPROVED HOSPITALS



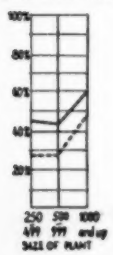
PERIODIC HEALTH EXAMINATIONS



KEY TO ALL CHARTS { Survey of 1929 – 1940 ------ / Survey of 1941 – 1942 ——

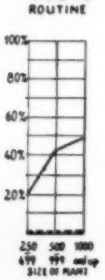
Total number of industrial companies in survey of 1929-1940 ····· 1596
Total number of industrial companies in survey of 1941-1942 ····· 175

MEDICAL SUPERVISION OVER HEALTH AND SANITATION



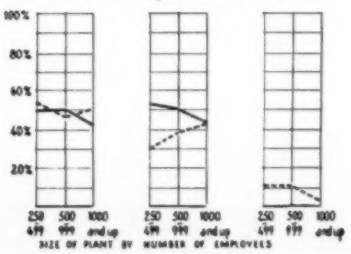
PREPLACEMENT WASSERMANN AND KAHN TESTS

ROUTINE

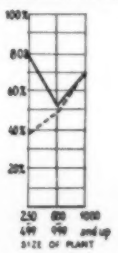


RANK OF MEDICAL DEPARTMENTS

Under Plant Management direct
Under Personnel Department
Under Insurance Carrier



MEDICAL SERVICES APPROVED BY AMERICAN COLLEGE OF SURGEONS



Medical Services in Industry

THE WORK of the American College of Surgeons in surveying industrial medical departments and approving those that meet the A.C.S. Minimum Standard for Medical Service in Industry, is brought up to date in the graphic presentation on the opposite page.

The Minimum Standards, and the Working Principles for an adequate medical service in smaller plants, are as follows*:

The A.C.S. Minimum Standard

THE industrial establishment shall have an organized medical department or service with competent medical staff including consultants and also shall have adequate emergency, dispensary and hospital facilities and personnel to assure efficient care of the ill and injured.

2. Membership on the medical staff shall be restricted to physicians and surgeons who are (a) graduates from an acceptable medical school, with the degree of Doctor of Medicine, in good standing and licensed to practice in their respective states or provinces, (b) competent in the field of industrial medicine and traumatic surgery, (c) worthy in character and in matters of professional ethics; in the latter connection the practice of the division of fees, under any guise whatsoever, shall be prohibited.

3. There shall be a system of accurate and complete records filed in an accessible manner, such records to include particularly a report of injury or illness, description of physical findings, treatment, estimated period of disability, end results, as well as other information pertinent to the case or required by statute for Workmen's Compensation claims or other purposes.

4. Patients requiring hospitalization shall be sent to institutions approved by the American College of Surgeons.

5. The medical department or service shall have general supervision over the sanitation of the plant and the health of all employees.

Working Principles

A DEFINITELY organized plan for the medical service.

2. A definitely designated staff of qualified physicians, surgeons and attendants—with one physician in charge of the service.

3. Adequate emergency, dispensary and hospital facilities.

4. Pre-employment and periodic physical examinations—to be made only by qualified medical examiners.

5. Efficient care of all industrial injuries and occupational diseases.

6. Reasonable first aid and advice for employees suffering from non-industrial injuries and illnesses while on duty. For further professional care such employees should be referred to their own private or family physicians.

7. Education of the employee in accident prevention and personal hygiene.

8. Elimination or control of all health hazards.

9. Adequate medical records including physical examination records, accessibly filed in the medical department under responsible medical supervision. Statistical summaries and analyses of the injury and illness experiences should be made periodically.

10. Supervision of plant sanitation and all health measures for employees by the physician or surgeon in charge.

11. An ethical and cooperative relationship with the family physician.

12. The use of hospitals approved by the American College of Surgeons.

*See INDUSTRIAL MEDICINE, February, 1942.

Re-employment of Ex-Service Men and Women

I. Obligations of Employer

IMPORTANCE OF ESTABLISHING POLICY AND PROCEDURE: Every employer who has employees in military service will be faced with many problems arising out of their return. It is important that each such employer, regardless of size, consider the known problems carefully and determine a guiding policy and plan to insure consistent and equitable treatment of all employees affected. It is none too soon to start this planning.

YOUR OBLIGATION AS AN EMPLOYER: The Selective Service and Training Act of 1940 provides:

"In the case of any such person who, in order to perform such training and service, has left or leaves a position, other than a temporary position, in the employ of any employer and who (1) receives such certificate, (2) is still qualified to perform the duties of such position, and (3) makes application for re-employment within forty days after he is relieved from such training and service. .....(B) if such position was in the employ of a private employer, such employer shall restore such person to such position or to a position of like seniority, status, and pay unless the employer's circumstances have so changed as to make it impossible or unreasonable to do so.

"Any person who is restored to a position in accordance with the provisions of paragraph (A) or (B) of subsection (b) shall be considered as having been on furlough or leave of absence during his period of training and service in the land or naval forces, shall be so restored without loss of seniority, shall be entitled to participate in insurance or other benefits offered by the employer pursuant to established rules and practices relating to employees on furlough or leaves of absence in effect with the employer at the time such person was inducted into such forces, and *shall not be discharged from such position without cause within one year after such restoration.*"

Under Selective Service Local Board Memorandum No. 190—Re-employment of Veterans—Local Boards are charged with the responsibility of assisting in the adjustment of controversies between the returned veteran and his former employer.

All firms, particularly those having any substantial number of employees in the service should secure a copy of this Memorandum and familiarize themselves with its contents as it relates to their responsibility.

We believe that it is the clear intent than an employee shall suffer no reduction in rate of pay or deterioration of job as the result of his military service. Recent rulings indicate that he may be paid the prevailing rate for the job to which assigned without War Labor Board approval, even though that results in an increase over his previous rate of pay. And he may be given any and all other benefits that may have accrued in this absence.

THE above is the text of the first of a series of booklets prepared by Associated Industries of New York State (361 Delaware Ave., Buffalo). It is a reprint, with a few minor changes, of a similar booklet previously issued by the A. I. N. Y. The original was presented to the National Industrial Council and unanimously approved at a meeting in Washington after searching discussion. The author is I. DENT JENKINS, Personnel Manager of Harrison Radiator Division, General Motors Corporation, who gratefully acknowledges the assistance of the Committee (of Associated Industries of N. Y. S.) on Re-employment of Ex-Service Men and Women, of which he is Chairman; also D. B. WHITNEY, Works Manager, Harrison Radiator Division, and DR. C. D. SELBY, Medical Director, General Motors Corporation, and JOHN F. MCMAHON, Managing Director of Industrial Hygiene Foundation of America, Pittsburgh. The purpose of the presentation is to draw to the attention of industrial executives generally, the legal and social responsibilities and some of the practical problems involved. The series will embrace six titles: No. 2, "Job Analysis for Sound Placement"; No. 3, "Medical Program"; and No. 4, "Placement and Follow-up"; with Nos. 5 and 6 to follow. The text of these will appear in successive issues of INDUSTRIAL MEDICINE.

CONSIDERATIONS NECESSARY IN DETERMINING POLICY: There are numerous questions that should be carefully considered in establishing your policy. Among these are:

1. *Time Limit for Re-employment*: Some companies allow a longer period than that provided by law. Are you going to treat this liberally, allowing 60 or 90 days for example; or are you going to adhere to the legal requirement of 40 days? Whatever policy you adopt, are you going to enforce it uniformly or are you going to consider it as minimum and treat individual cases on their merit? One variation might be rigidly to require application for re-employment within whatever time you set, but grant extension of time upon request for reporting to work.

2. *Job Placement*: Will you offer the employee his old job initially, or will you endeavor to offer a better one, if available? Will you attempt to recognize any new skills that the individual may have acquired?

3. *Training*: To what extent will you endeavor to supply needed training to qualify the individual to change back into industrial work?

4. *Upgrading*: To what extent will you endeavor to see that the individual will receive the benefit of any upgrading that he would have received had he not gone into service? Assuming that you want to do this, will your situation permit of fair determination of what such upgrading would have been? Will your seniority plan permit of it?

5. *Physical Examination*: What type of physical examination will you require?

6. *Rehabilitation*: To what extent will you endeavor to deal with the service casualty; i.e., the individual requiring some degree of rehabilitation to fit him for industrial employment? Will you provide medical supervision for those cases requiring such service if employed?

Whether or not under contract with a Union, the policy established must take into consideration every phase of employee relations. How ex-service employees are treated, their attitude, and the resulting attitude of other employees, is going to be most important.

Companies under Union contracts will need to consider their entire approach to these problems in light of both the law and the terms of their contracts, particularly with regard to seniority provision.

THE REHABILITATION PROBLEM: It is inevitable that the re-employment of service men will involve rehabilitation questions, in many instances questions of the gravest sort. This phase of the problem can be solved if approached soundly.

Larger companies with well-developed personnel policies, employee health programs, and the facilities to implement these, are rapidly developing rehabilitation programs commensurate with their size.

The smaller employer may feel that he lacks the facilities and experience necessary to the development of a sound program adequate for his needs. It is to help meet this problem that the following suggestions are offered.

Rehabilitation cases will probably fall into the following general classes:

1. There will inevitably be types of casualties with which the employer cannot deal and for which society at large, through the Government, will have to accept responsibility. These will include a large percentage of the mental cases, and those physical cases where impairment of function precludes immediate or future employment.

2. There will be handicapped individuals who will require considerable specific training before they are employable, but who after such training will be fully capable of taking their place in business and industry.

While many larger employers plan to shoulder a share of this training problem, most of the smaller concerns will not be in a position to do so. They can, however, keep in touch with those of their employees who receive training through public facilities, lend them encouragement, and consider their placement when trained.

3. There will be a large number of casualties which will require only proper job placement plus reasonable on-the-job instruction, plus adequate follow-up to insure proper adjustment.

It is this group of rehabilitation cases which offer the greatest placement possibilities, particularly to the smaller employers.

GENUINE INTEREST AND SYMPATHETIC UNDERSTANDING NEEDED: From the initial interview through placement and follow-up it is imperative that individuals who are responsible for dealing with the re-employment and placement of ex-service men be genuinely interested in this work and have the capacity for sympathetic understanding of the physical and human relations problems involved, together with the ability to evidence this understanding in a thoroughly practical and helpful manner. It cannot be too highly emphasized that this helpfulness to be effective must be unobtrusive. The requirement for the proper type of individual to head up this work applies whether full or part-time is needed. These traits are also necessary to a considerable degree in the supervisors who will come in direct contact with the individual after placement.

As one man with a great deal of interest and experience in this field, in referring to battle casualties, has very aptly put it: "We can't expect men whose training and business is killing on a 24-hour-a-day basis, to be magically transformed to the humdrum routine of a work-a-day world by simply doffing a uniform. Unquestionably there will be a lot of difficult cases which will require a generous shot of plain Christian charity upon the part of the Supervisor."

THE PHYSICALLY HANDICAPPED PERSON NOT A LIABILITY: It should be emphasized that the rehabilitation case; i.e., the handicapped individual, properly placed on appropriate work will usually cease to be handicapped as far as the job to which assigned is concerned. This is all too frequently overlooked, with the result that the employer assumes that the placement of a handicapped person represents a continuing financial burden. This is not only generally incorrect, but, on the contrary, it not infrequently happens that the so-called handicapped worker, when properly placed, grows more efficient than the physically normal person, because of closer attention to and interest in the job.

DEVELOPING THE REHABILITATION PROGRAM: We believe that the following are basic considerations of any rehabilitation program, regardless of size:

1. The problem must not be approached solely from an altruistic viewpoint. On the contrary, the objective must be to place individuals on jobs for which they are suited and on which they can perform in a wholly satisfactory manner after a reasonable break-in time.

2. The individual *must* be given to understand that this is the basis of the program. He will neither want nor, in all probability, tolerate sympathy or charity.

3. Proper placement of the individual on suitable work pre-supposes that the placement will be handled by a competent person who is thoroughly familiar with the job or operation within the plant or business. This person must possess a sound knowledge of what each job or operation requires of the operator. This may or may not be a full-time job, depending on the size of the organization.

4. Placement must be checked and guided, and, in many instances, followed by competent medical service.

RECEIVING THE RETURNED SERVICE MAN: The first step is the reception of the returned service man. Make him know that he is welcome. Get as complete a summary of his war experience as possible. Draw out his present interests, his attitude toward his former job, toward what he would like to do, etc. Make all of this a part of your records.

This does not require an elaborate record procedure. If you will have a fairly large number of cases to deal with, a form may be desirable, but a carefully written memorandum is all that is needed.

This does require a mature person, possessing a genuine interest in the individual, to conduct the interview in a friendly and yet thorough manner.

PHYSICAL EXAMINATION: The physical examination should be very thorough and carefully recorded. Where you are going to be very liberal in your acceptance of those who have suffered some impairment, this is *particularly true*. The facts developed by this examination will guide you in job placement and future medical follow-up. It should be fully recognized that accepting a known risk is much safer to the individual and the employer than is accepting an unknown one. It may also be safer to other employees.

JOB KNOWLEDGE REQUIRED FOR PLACEMENT: As has already been indicated, the individual who is responsible for interviewing the returning service man, determining his interests and qualifications, and assigning him to a job must of necessity know a great deal about the work available within the plant. Of course, where the individual has no handicap which will preclude his returning to his former job, and the former job is available, the problem of placement study does not exist. This problem, however, will be present in every case requiring the placement of a casualty of any degree of severity.

In small organizations thorough knowledge of job requirements may involve no special effort, but where there is a wide variety of occupations and job classifications, possibly running into several hundreds, there must be a systematic approach.

MEDICAL SUPERVISION: It is a mistake for the plant which is too small to afford a full-time medical staff to assume that it is therefore deprived of the possibility of giving adequate medical supervision to disability cases. Regardless of how small a plant may be it should have on its staff, on a part-time or call-in basis, some one physician who will take enough interest in the plant to become generally familiar with working conditions, occupational disease hazards, and, to a substantial degree, occupational hazards generally. It is money well-spent to pay the part-time physician for a sufficient amount of his time to enable him to become familiar with the plant as here indicated. If this is done the physician, assuming his general competence of course, will be in position to deal with the individual rehabilitation case in an intelligent manner. He will be able to counsel in the placement of the individual and to suggest the type and frequency of medical follow-up, if in his judgment such follow-up is required. In a somewhat larger plant that does have a full-time plant physician, these functions will of course come under the plant physician.

There will be types of cases on which either the full or part-time physician will feel the necessity of calling in outside expert consultants. It is suggested that this be encouraged.

While it is probably true that no organization seriously considering the establishment of a rehabilitation program to meet its needs can expect to do so without adequate medical advice and assistance, it is equally true that if this is approached on a practical, common-sense basis the smallest concern can meet the requirements adequately. When part-time medical assistance must be relied upon, it is advised that this not be scattered over a number of physicians, but that it be confined to one or two physicians to insure reasonable familiarity and consistency of approach in dealing with problems.

IMPORTANCE OF POLICY IN NEGOTIATING UNION CONTRACTS: Those companies who are under contract with the union would be well advised to include clauses in their union contracts which will enable the company to execute its policies without conflict with the terms of the contract.

GENERAL: It is hoped that these suggestions will indicate that it is possible to develop for the individual organization a program commensurate with its size which will enable it to make its full contribution to the re-employment of returned service men, with particular emphasis on casualties. It is not the intent of this paper to offer a plan for adoption in any organization, but simply to suggest an approach which should be useful to the executive who is faced with the responsibility of developing his own plan.

Industrial Health Forum

—This Material is prepared by the Division of Occupational Hygiene, Massachusetts Department of Labor and Industries, Boston—

Butanol

QUESTION: We have been using butanol as a solvent for our cement in making a waterproof poncho. Almost all of the workers have some inflammation of the eyes. We also use some ethyl alcohol which is denatured with methyl alcohol and naphtha. Could you tell us if butanol is the responsible agent, and what we can do about controlling this?

ANSWER: Butanol is undoubtedly the offending agent in this instance, as a number of plants using this material have had the same sort of difficulty. Butanol in rather low concentrations apparently can produce an irritation of the eyes which improves upon removal from exposure. The material as ordinarily used is not very toxic, but may cause a dermatitis of the hands by washing the fat out of the skin. Medical and engineering methods are usually effective in controlling this hazard. It would be advisable to request your Industrial Hygiene Division in your State Department of Health to survey the working conditions and advise on methods of prevention.

Radiant Heat

QUESTION: We have quite a heat problem in our press room where we vulcanize rubber. I was told that if I had the machines painted a light color, it would cut down the heat. The machines would probably get dirty in a very short time, but if it would be of help I would seriously contemplate doing this. Have you information as to whether this scheme would work?

ANSWER: A highly polished or

light, glossy painted surface will decrease the amount of radiant heat. Theoretically, radiant heat travels as do light waves and can be reflected. Aluminum paint has a high reflectivity and would probably be better than other types of paint. One company has reported a thirteen-degree drop in temperature after applying two coats of aluminum paint to the press. It is important to purchase a paint which is heat resistant; otherwise the excessive temperature of the press will cause the paint to darken or crack and peel off. To be effective, it is important that the painted surfaces be kept clean and bright at all times.

A more satisfactory and efficient manner of reducing such heat is by the use of insulation. Wherever possible, all steam pipes should be covered with regular pipe lagging. The presses may be covered with asbestos board or a plastic insulation, held in place with fine mesh wire.

Nursing Education

QUESTION: Where can I get information on courses in industrial nursing? I am a graduate nurse working in a small plant, and would like to prepare for advancement to a position on a large staff under a full-time medical director after the war.

ANSWER: In the summer session of 1944, courses were given in industrial nursing in the following schools: Loyola University, Chicago; University of Minnesota, Minneapolis; St. John's University, Brooklyn; New York University, New York; Syracuse University, Syracuse; George Peabody College for Teachers, Nashville. It seems safe to assume that most of these courses will be offered again in the coming school year. A recently announced course in industrial nursing is that to be given this fall at Simmons College, Boston.

For further information, we suggest that you write to Miss Heide L. Henriksen, R.N., industrial nursing consultant, National Organization for Public Health Nursing, Inc., 1790 Broadway, New York City; Mrs. Gladys Dundore, R.N., executive secretary, AMERICAN ASSOCIATION OF INDUSTRIAL NURSES, 54 West 10th Street, New York City; or to the Department of Public Health, Labor or Education of your state.

In the event that you are not located within commuting distance of the nearest school, there is always the possibility of organizing a local group for the purpose of meeting and securing instruction in industrial nursing.

Mercury in the Urine

QUESTION: We make a device containing mercury, using only very small amounts. One girl has complained of nervous symptoms, and her doctor suggested that she may have mercury poisoning. We have had her urine analyzed for mercury, and it did show a slight amount. On the other hand, our engineers have made air tests and could not detect any mercury in the workroom atmosphere. Can you give us information which would be helpful in this situation?

ANSWER: The absence of mercury vapor in the air does not preclude the possibility of poisoning, as mercury in all forms may be inhaled or swallowed, or may be absorbed through the skin. In the operation you describe, the probability is that there has been skin absorption. Normally, no mercury is excreted in the urine, and only very small amounts are present in individuals who have had contact with a mercury ointment or mercurial antiseptics, or have recently had mercury amalgams for dental repair. The limit above which a hazardous exposure is deemed to exist is 0.25 mg. mercury per liter of urine. Every effort should be made to maintain complete cleanliness of the work bench and scrupulous personal hygiene on the worker's part, so as to prevent accidental ingestion or absorption. Rubber gloves are indicated if mercury must be handled.

Dermatitis from Vinyl Carbazole

QUESTION: An outbreak of dermatitis in our plant has been unusually severe since we have introduced a new chemical, vinyl carbazole. Our research technicians tell us that they have had some degree of dermatitis from time to time. Can you give us any information on this substance?

ANSWER: Vinyl carbazole has been developed only recently and within the past year has been used in manufacturing operations. In a plant manufacturing the material, dermatitis has occurred but was controlled following proper engineering and personal protective measures. The chemical is a potent allergic dermatitis-producing agent and will cause some degree of skin trouble in practically all people who come in repeated contact with it. It apparently causes no systemic complaints, and most people are able to "harden" to it.

Satisfactory control measures consist of proper engineering and work methods to minimize the contact of the material with the skin, protective clothing and meticulous personal hygiene of the worker.

Antidote for Spilled Poisons

QUESTION: We use a variety of chemicals in our plant and have long been concerned as to the possibilities of poisoning through accidental skin contact or swallowing. Are there any general rules as to what to do in such cases?

ANSWER: Treatment should always be prompt and directed first toward removing the poison, second toward rendering it harmless, and third toward symptomatic treatment of the patient.

On the skin and on accessible mucous membranes, thorough washing with water is the best, easiest and most effective method of removing the poison. Any neutralizing chemical which may be used should be so diluted that it will not of itself injure the skin. For acids, add soap, sodium bicarbonate, borax or lime water to the wash water; for alkalis, dilute vinegar or lemon juice are the best neutralizants.

If chemicals are swallowed accidentally, the best treatment is immediate lavage, even though vomiting may have occurred spontaneously. If the lavage is not immediately available, evacuation of the stomach by emesis is indicated. Apomorphine, if available, is the most effective emetic. Other measures, such as irritation of the fauces with the finger or gargling with soapsuds or mustard may be effective.

Chemical antidotes that may be used in the alimentary tract are:

1. Against acids—alkalis, such as soap, chalk or baking soda.
2. Against alkalis — vinegar or lemon juice.
3. Against the organic poisons — oxidizing agents, of which dilute potassium permanganate is best (1 part in 2000).

It should be remembered that, rather than to waste time looking for the specific antidotes, one should use the general measures of (a) removing the poison, and (b) supporting the respiration, heart and vasomotor tone.

Dermatitis and Alcohol

QUESTION: We have had an outbreak of skin rashes due to the use of a phenol-formaldehyde resin. A doctor in the community claims that we can cut down the number of cases by selecting men who are complete teetotalers. He is also of the opinion that people who drink a lot of carbonated beverages are more apt to get it, as well as those with light skins. Is it worthwhile to attempt to select workers on this basis?

ANSWER: It is well known that a variety of factors predispose some individuals to dermatitis. People with dark skin are less apt to be irritated by allergic agents such as the phenol-formaldehyde resins, but this quality is not marked enough to warrant excluding workers with light skin. There is no substantial proof that the use of carbonated beverages or alcohol in moderation increases the number of cases or degree of dermatitis from phenol formaldehyde. It is quite possible that individuals who consume more than ordinary amounts of alcohol or "soda pop" may perspire more freely and in this way have greater exposure by dissolving the dermatitis-producing agent. The consumption of alcohol has been alleged to increase inflammation of the skin in individuals exposed to calcium cyanamide used in making fertilizer and to tetramethyl thiuran disulfide used as a rubber accelerator.

Control of the hazard should rest in good engineering and mechanical means to prevent contact, protective clothing if indicated, and fully adequate personal hygiene.

New Theory of Hip-Nailing

—Precision Technique for Intracapsular Fractures—

HERMAN W. WELLMERLING, M.D.,
President-Elect, Central States Society of Industrial Medicine and Surgery, Bloomington, Illinois

UNTIL a few years ago, one of the most tragic accidents of later life was an intracapsular fracture of the hip, for the outcome was so often a fatal termination, especially as these occur in individuals of advanced years. Many of such cases may now be crutch ambulatory and discharged from the hospital in seven to 10 days.

The development of the Smith-Peterson technique has been a great contribution to the advancement of medical science. This technique gained popularity, and many variations and modifications ensued. With these we were confronted with nearly every type of

Fig. 1.
Position of five-inch nail

fixation apparatus such as flanged nails, bone pegs, multiple threaded pins, lag screws, angle nails, and, supposedly to assure good results, we were also given directors, finders, levels, impactors and foolproof gadgets. In this regard we quote a paragraph by R. Watson-Jones, in his book "Fractures and Joint Injuries":

"Danger of Undue Reliance on Directing Apparatus—One method of nailing fractures of the neck of the femur has been described which depends on the mathematical calculations of a technician using spirit-levels, protractors and adjustable apparatus; the surgeon himself has nothing whatever to do until, on the instruction of his competent assistant, he strikes the nail on the head with a mallet! This is an extreme example of the danger of all directing apparatus. The surgeon tends to rely upon the instrument, to forsake his own judgment, and to demand infallibility of a mechanical device. The directing apparatus which is infallible has not yet been described. Indeed my own experience has been that an increasing use of mechanical aids has multiplied the sources of error. Not one of the directing devices I have employed, including those of Wescott, Hey Groves, Rendu, Engel and May, has been found worthy of usurping the surgeon's own skill and judgment. After a fair trial of these methods I have reverted to a simple technique of insertion of a guide wire and cannulated nail, controlled at all stages by two-plane radiography, which depends on the senses of sight and touch."

Little thought had been given to what part of the neck needed the support, or what pressure the bone in which the nail was inserted would tolerate. Erroneously

Fig. 2.
Normal hip, A.P. view, showing weight bearing angle. Center of acetabulum designated by marker

seeking the simplest and surest way of placing the fixation devices in the center of the neck, many variations of incisions were made, from a one-half inch incision made over the greater trochanter where the bone was superficial to a hockey-stick type of incision from the anterior superior iliac spine to the mid-thigh, ligating vessels, and exposing the capsule and the proximal third of the femur. When fixation failed, heads rotated, bone absorbed and pins came out, new devices were tried.

In many instances, nails failed to provide adequate fixation, which resulted in non-union and absorption of the neck, often resulting in reconstruction surgery such as the MacMurray and Schauntz osteotomies, which provided the only assurance of a functional hip.

Precision nailing of the hip enables the surgeon to use one size nail for all adult patients, placed symmetrically in a specific position in the neck, avoiding the excess use of direction finders, x-ray, and anesthesia. Since the declaration of World War II, precision pinning and nailing has been receiving ever increasing popularity from those practicing skeletal fixation techniques, the importance of which was so ably described by DR. H. D. JUNKIN in his article on "The Topography of Pins" in the May, 1944, issue of INDUSTRIAL MEDICINE.

Precision nailing of intracapsular fractures can only be successfully executed by those who are consistent in their type of reduction, x-rays, positioning of the patient, location of the incision, and placement of the nail.

We advocate the use of a five-inch cannulated vitallium Smith-Peterson nail inserted in such a manner that it parallels and is in contact with the medial and anterior cortex of the neck, as shown in Fig. 1. We started the research on the use of this nail in 1937 but did not go over solely to this technique until 1941; since that time we have used it successfully on 97 cases. In promoting the technique

Fig. 3.
Normal hip, lateral view showing angle of declination

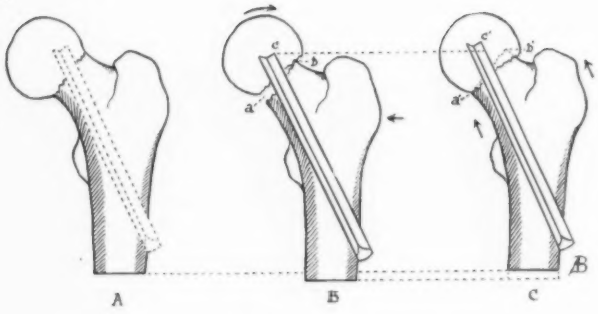


Fig. 4.
(A) Anatomic position (B) Coxa valga position (C) Final position fragments interlocked

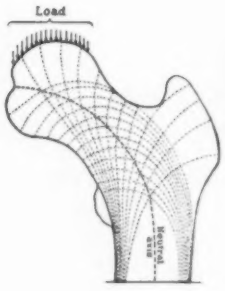


Fig. 5.
Two distinct systems of trabeculations adapted to carry and transmit the load on the femoral head

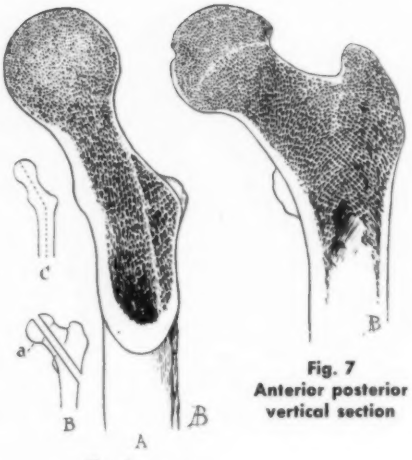


Fig. 6
Lateral vertical section

Fig. 7
Anterior posterior vertical section

we have approached the problem from every angle and have taken into consideration the engineer's viewpoint and his explanation of the mechanics of anatomy and dispersement of leverage — these things accounted for most of our failures in hip nailing and their study has given us a satisfactory explanation for the absorption of bone previously encountered.

The following review of the mechanics of anatomy, bone architecture and the clinical findings should substantiate this technique for the nailing of all intracapsular fractures.

Normally the weight of the body is supported by the neck of the femur at an angle of approximately 127° distally from the acetabulum with a 20° posterior angle known as the angle of declination. (See Figs. 2 and 3.) If the fractured hip is over-reduced in a coxa valga position as advocated and the five-inch nail is placed in the specified position, it will be noted that the normal weight of the body will be in direct line with the long axis of the nail.

Shearing action fractures reduced by over-traction and fixed in a coxa valga position, interlock the fragments and restore the normal length to the limb.

An anatomical reduction of a sub-capital fracture is illustrated in Fig. 4, section A. When additional traction is applied with the limb in adduction, the shaft is pulled distally underneath the head, causing a rotation of the head and a coxa valga deformity, resulting in the opening of the fracture site on the medial side as designated in Fig. 4, section B at a. This will result in the limb being ¼ to ⅜ inch longer than the well leg and also changes the angle of the fracture line. When these fragments are fixed in this position in such a way that they may impact themselves, the distal fragment moves up into the head postoperatively, creating an interlocking of the fragments on the lateral side of the neck, as shown in Fig. 4, in section C at b^1, while the fragments come into contact on the medial side of the neck as designated by a^1. This restores the limb to the normal length and disperses all shearing action. Even a fibrous union with some absorption of the

Fig. 8.
Nail not in contact with medial and anterior cortex of the neck

Fig. 10.
Complete failure

Fig. 9.
Thirty days postoperative, nail changed position

Fig. 11.
Pins inaccurately placed

Fig. 12.
X-ray showing line of fracture parallel to shearing force

neck should result in a functional limb with a minimum amount of shortening and assurance that a coxa vara deformity will not be present.

Bone Architecture

THE architecture of the upper end of the femur is remarkably adapted to the mechanical requirements involved in the load on the femoral head.

The bone of the upper femur is composed of two distinct systems of trabeculae arranged in curved paths, one having its origin in the medial side of the shaft, curving upward in a fan-like radiation to the opposite portion of the bone,

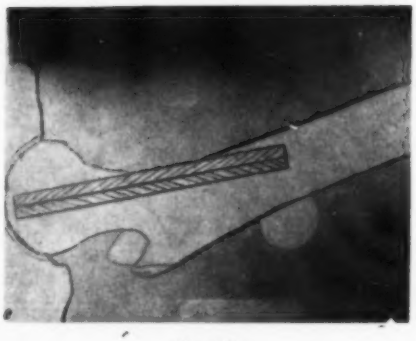


Fig. 13.
Nail started in center of lateral aspect

Fig. 14.
Nail started posterior of lateral aspect

the other having its origin in the lateral portion of the upper shaft and arching upward and medially to end in the upper surface of the greater trochanter, neck and head (Fig. 5).

Of the two systems of trabeculae, the medial group is the principal supportive system of the upper end of the femur. These trabeculae are placed very closely together and are the thickest seen in the upper femur. They are prolongations of the shaft from which they spring in straight lines which gradually curve to meet at right angles to the articular surface.

Thus the result of this converging of these dense trabeculae is a *thickened anterior and medial cortex* which acts as the main supporting structure of the upper end of the femur (Figs. 6 and 7).

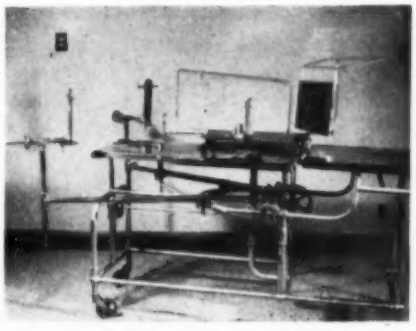


Fig. 16.
Table showing x-ray tunnel before table top was lowered. Picture taken from side opposite surgeon

Therefore, it is seen from the bone study of the architecture of the upper end of the femur, that in a fracture in this region, especially intra-capsular types, the important consideration would be the re-establishment of these supportive structures.

This cortex of the neck is much thicker, since it receives the greater portion of stress and strain exerted on the bone in this area. This important structure must be foremost in our minds at all times, and when using an internal splint it should parallel and be in contact with this cortex so that it will act as a splint, reinforcing the structure that receives the greatest amount of strain.

Internal splints that are not parallel to or come in contact with this cortex have a tendency to result in a non-union with a coxa vara deformity and absorption of the head and neck; this supporting structure seeks new support, additional strain is put on the nail and the fragments change position, usually resulting in a complete failure before any support can be

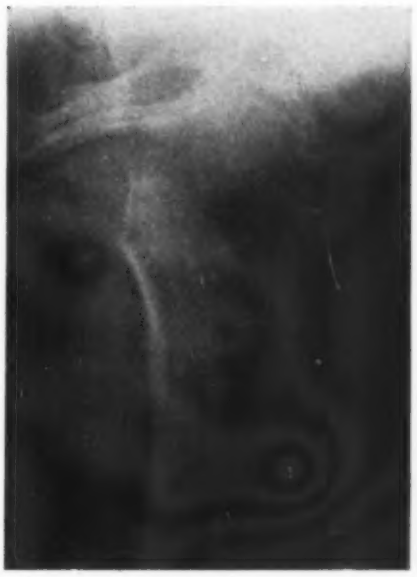


Fig. 15.
Anterior bowing in lateral view

gained. In Fig. 8 the nail was not placed in contact with the dense cortex of the medial side of the neck, and it changed position and resulted in a possible failure, as seen in Fig. 9, which is 30 days postoperative, and shows the nail working out of the head. In Fig. 10, the nail is not parallel and in contact with the dense cortex of the medial and anterior portion of the neck, resulting in non-union, absorption of the neck and bending of the nail as the full strain was encountered. In Fig. 11, the pins are inaccurately placed, for obvious reasons; and the fracture is not immobilized, resulting in complete absorption of the neck and head.

Further study of different bone sections taken from this area, simi-

Fig. 18-A.
Original x-ray

Fig. 18-B.
Reduction A.P.

Fig. 18-C.
Reduction lateral

Fig. 18-D.
Position of guide pin A.P.

Fig. 18-E.
Position of guide pin, lateral

Fig. 18-F.
Nail inserted, A.P.

Fig. 18-G.
Nail inserted, lateral

Fig. 18-H.
A.P. seven days postoperative

Fig. 18-I.
Postoperative six weeks

Fig. 18-J.
Postoperative two and one-half years

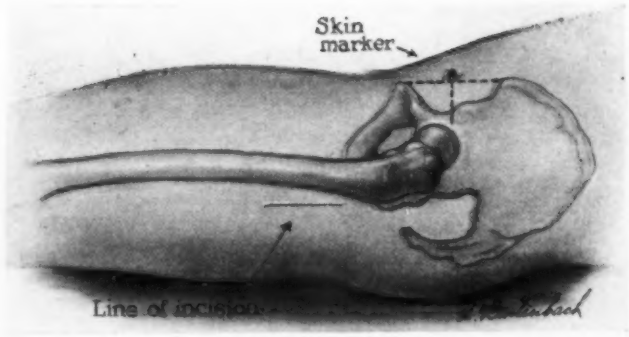


Fig. 19.
Skin topography, (incision, etc.)

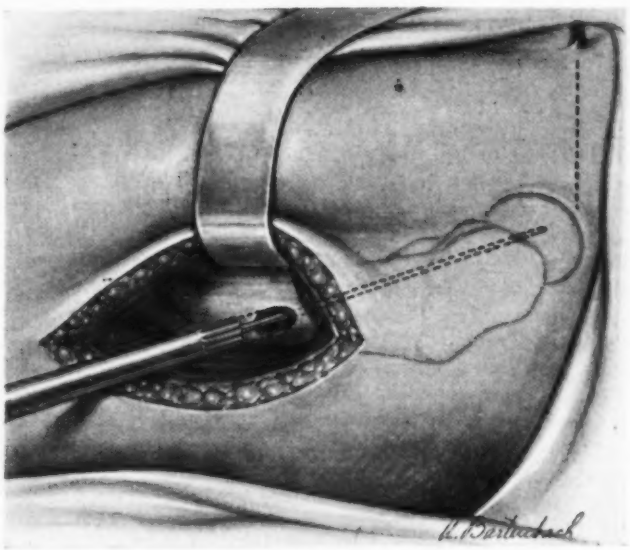


Fig. 20.
Incision showing reamer, guide pin and retractor

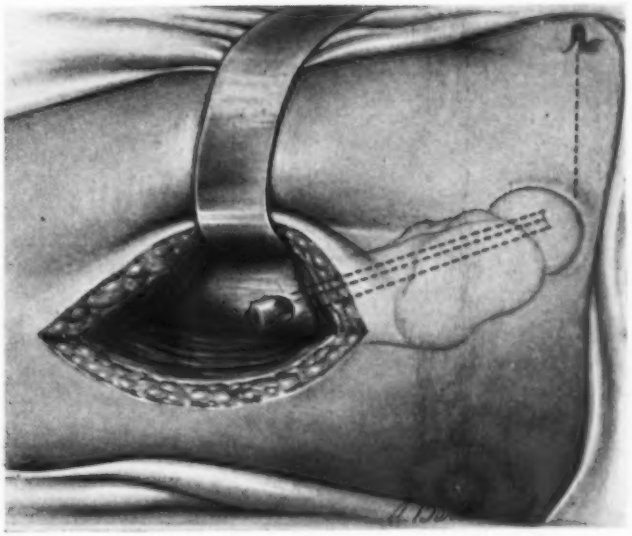


Fig. 21.
Exposure showing nail in place

lar to those in Figs. 6 and 7, and noting the variation in density between the cancellous and corticle bone and their tolerance to mechanical pressure without absorption, we have arrived at the following conclusion: The cancellous bone in this area will not tolerate excessive mechanical pressure without creating a pressure necrosis, resulting in absorption of the head and neck. This may be avoided by selecting a technique such that the internal splint (which is used to balance the head on the neck) will reduce the pressure exerted on the cancellous bone by the splint to a minimum.

From a further observation of the architecture of the upper end of the femur, it will also be observed that the honey-combed structure closest to the dense cortical bone is softer and less dense, due to the vascularity of this region which corresponds to the medullary canal of the shaft.

Internal supports could be placed in this area paralleling and in contact with the dense cortical bone, with a minimum amount of destruction of the bone cells and a maximum amount of support to the supporting structure.

Supports properly inserted to allow self-impaction will give perfect immobilization and constant contact of the fragments, resulting in earlier union and restoration of function.

Fractures of this type which are treated with due consideration of the muscle action and mechanics of anatomy of the hip, using the surrounding structures as friendly agents to assist in keeping the fragments in apposition, will enable one in many cases to have his patients crutch ambulatory without the aid of a caliper in from five to seven days and released from the hospital in 21 days, resulting in complete weight bearing in a period of three months.

In selecting this position for the nail, it will be noted that this is the only position where the nail receives the support of the dense corticle bone on both sides of the distal fragment. In our past experience, we have found that the use of screws, Steinmann pins, wires or other devices inserted into the bone was very unsuccessful except in cases where they received the support of the cortex on both sides of the bone.

In reviewing the previous cases which have resulted in the loss of positioning and shortening of the limb, it will be noted that the nail has changed position in the distal fragment, owing to the absence of support of the medial cortex of the distal fragment.

A Smith-Peterson nail shouldn't be used in intertrochanteric fractures and fractures where the comminution has destroyed the medial portion of the neck unless some other means of support of the nail is gained to compensate for the support lost on the medial cortex. It may be possible to ignore this factor on one or two cases and, by being extremely careful with the postoperative treatment, one may not run into difficulty. However, if one were to treat a series of cases this way, the final analysis would be very unsatisfactory.

Some feel that this new position of the nail may be successfully used for intertrochanteric fractures but, contrary to their belief, we insist that this technique is contra-indicated in these cases, and there are more desirable techniques that may be employed.

It is no longer necessary to impact fractures when using this low position of the nail, as the fragments will impact themselves and keep in constant contact even if the patient is never out of bed. This nail is placed nearly in the direct weight-bearing line, and thus the strain put on the nail and surrounding bone cells is diminished to a minimum. The nail acts only as a means of balancing the proximal fragment on the distal fragment, and a great deal of the weight applied to this limb would be transmitted between the fragments and only a minimum amount received by the nail itself.

The lateral cortex should be ma-

chined so that the nail is not driven in under pressure, as too much pressure, even in corticle bone, will cause a pressure necrosis and absorption, resulting in the nail becoming extremely loose. The nail should never be attached to the cortex or inserted in such a way that it cannot recede, as it has a tendency to prevent the fragments from coming into apposition (Fig. 20).

Failure to complete the reduction in the lateral view will result in the complete or partial loss of the posterior angle from the acetabulum (known as the angle of declination), which may not cause any noticeable loss of function but is definitely one of the causes of failure of accurate placement of the internal splint. If the reduction is not complete, it may readily be seen in the lateral x-ray (Fig. 15) as an anterior bowing of the fracture site or loss of the angle of declination. Lateral of a normal hip may be seen in Fig. 3.

The internal splint should parallel and be in contact with the anterior cortex of the neck. To accomplish this, it is necessary to enter the cortex just posterior to the center of the lateral aspect of the shaft and direct it at a 20° anterior angle or angle of declination, as shown in Fig. 14 in the lateral view. Internal splints erroneously placed in the true lateral or anterior to the lateral aspect of the shaft are bound to emerge through the anterior surface of the neck even if they are directed posteriorly in an attempt to enter the center of the head. This may be seen in Fig. 13 in the lateral view.

In reviewing the application of this technique, we will review the case of Mrs. F., who was operated on three years ago, from the original x-ray of the fracture (See Fig. 18-A) to the final x-ray taken two and a half years postoperatively. This patient was placed on a fracture table similar to the fracture table shown in Fig. 16, which has an x-ray tunnel and a lateral cassette holder with a direction finder to simplify the procedure of taking x-rays. The fracture was reduced by placing both legs in a neutral position, leaving the injured limb in complete external rotation, with the feet securely tied to the foot plates, in such a manner, that the heels would not lose contact when the knees were flexed under traction. Traction was then applied to both limbs until the injured limb was approximately ¼-inch longer than the well leg. The injured limb was then internally rotated by grasping the condyles of the femur while the assistant rotated the foot until the patella was in neutral position with toes directed toward the ceiling with the foot in approximately 5° external rotation.

The angle of declination was then restored by placing one arm underneath the popliteal space while the other was placed anterior to the proximal end of the distal fragment. Pressure was applied by clasping hands between the patient's legs and raising the knee while pressing posteriorly over the proximal end of the distal fragment. The amount of traction was increased by flexing the knee by the effort exerted in attempting to press posteriorly at the fracture site.

The clinical examination indicated that the reduction was complete, so we abducted the well leg approximately 35° and placed a Rochelle clip midway between the anterior superior iliac spine and the pubic spine (where the femoral artery crosses the Poupart's ligament) to signify the center of the acetabulum, Fig. 19.

Anterior-posterior and lateral radiographs of the reduction were taken at 90° angles from each other. In the original anterior-posterior view, the tube was centered exactly over the center of the skin marker, as there was considerable distance between the skin and the bone and failure to center the tube would have distorted the position of the skin marker on the x-ray plate. It was not necessary to center the tube accurately on repeated x-rays, as we determined the position of the marker, being attached to the skin, only by what appeared on the original film.

In the lateral view, x-rays were taken without disturbing the pa-

Fig. 22-A.
Right hip anterior-posterior view of fracture

Fig. 22-B.
Nail in position, A.P.

Fig. 22-C.
Nail in position, lateral

Fig. 22-D.
Sixty days postoperative

Fig. 23-A.
Nail in place on table, A.P.

Fig. 23-B.
Nail in place on table, lateral

Fig. 23-C.
Postoperative three months

tient by placing the tube on the medial side of the knee of the well leg while the cassette was pressed firmly against the body just proximal to the ilium at a 60° angle from the body and parallel with the tube. The tube was centered in direct line with the neck of the femur (thus causing most of the distortion in the shaft of the femur) or four inches from the edge of the cassette which was next to the patient's body.

Radiographs (Reading)

THE anterior-posterior view (18-B) showed a coxa valga deformity with an opening of the fracture site on the medial aspect of the neck. This view showed correct positioning of the skin marker designating the center of the acetabulum. The lateral view (18-C) was placed on the view box in a supine position to correspond with the position of the patient to determine the 20° posterior angle of declination from the acetabulum. The reduction was complete, which greatly simplified the insertion of the nail, although it was not essential in obtaining a functional hip.

The line of incision was parallel with the table top, one inch posterior to the bone and extended from a point two inches distal to the center of the greater trochanter for a distance of 4½ inches, as designated in Fig. 19. An exposure was then made, not by going through a great thickness of muscle, but by dividing the fascia posteriorly and exposing the bone by retracting the muscles anteriorly, using one retractor resting on the anterior surface of the bone. (Fig. 20.) Many complications might have been encountered if we had retracted the skin anteriorly and gone through a greater body of muscle and cross fibers in attempting to make a lateral exposure. The exposure being complete, we drilled a 5/32-inch hole through the lateral cortex, directing the drill in line with the center of the acetabulum at approximately a 20° anterior angle, starting the drill at a point two inches distal to the distal prominence of the greater trochanter just posterior to the mid line of the lateral aspect of the shaft of the femur. The lateral cortex being drilled, a 3/32-inch x 10-inch Steinmann pin with a non-cutting point was inserted, directed toward the skin marker at a 20° anterior angle along the line of least resistance. When resistance was encountered, we did not attempt to drill but checked our position, as we were aware that this pin follows across

Fig. 24-A.
Nail in position, A.P.

Fig. 24-B.
Nail in position, lateral

Fig. 24-C.
Check-up x-ray 30 days postoperative

Fig. 25-A.
Pre-operative x-ray

Fig. 25-B.
Operative A.P. view

Fig. 25-C.
Postoperative 30 days

Fig. 25-D.
Postoperative 60 days

the canal and parallels the medial and anterior border of the neck and should not meet with resistance until reaching the upper third of the head of the femur. When resistance was encountered, we checked the location where we entered the lateral cortex and the direction of our guide pin. We never attempt to drill this guide pin into position.

With the pin in position, x-rays were taken and we proceeded to machine the lateral cortex. A cannulated Meekison facer was placed over the guide pin and as it came in contact with the cortex it was cut away by an accelerating motion while normal saline was used to wash away the bone shavings and keep the cutting edges clean. All of the lateral cortex was re-

Fig. 26-A.
Original x-ray

Fig. 26-B.
Lateral of reduction guide pin in place

Fig. 26-C.
Operative A.P. of nail in position

Fig. 26-D.
A.P. 60 days postoperative

moved until the facer freely entered the canal, as shown in Fig. 20. Caution was taken to be sure the facer was kept in true alignment, for, if a strain was created on the guide pin, the facer would proceed to cut into it, not only destroying the pin but also making it impossible to insert the Smith-Peterson nail over it.

The radiographs showed correct position of the guide pin, as seen in Figs. 18-D and 18-E. A five-inch Smith-Peterson nail was then placed on a driver and inserted over the guide pin, holding the nail so that the two flanges would enter the bone first and span the medial border of the neck, supporting same while the third flange was in a proximal direction. Care was taken to see that the third flange entered the canal properly, for, if it had cut into the dense cortex and been hammered through, it may have had a tendency to fracture. The nail was then inserted until it came into contact with the upper third of the head. This nail received only a minimum amount of resistance and periodical check-ups were made to be sure that the nail was not impinging on the guide pin which would have a tendency to drive it ahead of the nail into the pelvic cavity. With the nail in position, the guide pin was removed (Fig. 21) and we proceeded to make our closure while the position of the nail was checked by x-ray, as shown in Figs. 18-F and 18-G. The position being satisfactory, the patient was returned to bed.

The patient was moved on his face at least once a day, set up immediately and allowed to be crutch-ambulatory as soon as possible. The injured limb should never be flexed at the hip or abducted in an attempt to take a lateral view during the period of convalescence.

An anterior-posterior x-ray was taken seven days postoperatively, as shown in Fig. 18-H. The fragments moved into position after patient returned to bed. Another anterior-posterior view, as shown in Fig. 18-I, was taken six weeks postoperatively and the patient was discharged from the hospital. X-ray checkup was made two and a half years after surgery; this is shown in Fig. 18-J.

We are submitting a series of x-rays on five cases as seen in Figs. 22, 23, 24, 25 and 26 for x-ray study so that the accurate placement of the nail may be seen and the postoperative changes in position of the fragments, noting that it is not necessary in all cases to drive the nail into the cortex of the head. Also it can be noted how the nail recedes in the lateral cortex as the fragments come into apposition, and interlock with one another as first shown in Fig. 4Cb[1].

The author was not aware of the work done by Professor Dr. Gerhard Kuntschner, of Kiel, Germany.[13] However, he feels that those interested in this technique would do well to read this article. The text and its cuts show that the greater majority of the cases treated were intertrochanteric fractures. There is no similarity between the basic principles brought out in his work and those of the author. However, if Professor Kuntschner is still using this technique, he may have developed interesting material for medical publication since 1939.

Summary and Conclusions

EXPERIENCE has been quoted based on 97 cases since 1941 and with reference to research beginning in 1937.

A review of the mechanics of anatomy, bone architecture, and clinical findings has been given justifying this technique for the purpose of nailing intracapsular fractures. Supplementary radiographs both in lateral and AP views show the reasons for failure and the correct procedures needed to get favorable results. It is not necessary in all cases to drive the nail into the head; with the aid of x-ray films it can be noted how the nail recedes in the lateral cortex as the fragments come into apposition, how the change in the fracture line has been maintained, and how the fragments interlock with one another. Additional x-ray films afford comparisons at various postoperative periods.

Details of skin topography, the nature and location of the incision, the technique of the use of the reamer, guide pin and retractor, and also the position of the nail, have been particularly emphasized, with the use of explanatory drawings.

It is believed that this technique is contra-indicated in cases of intertrochanteric fractures.

From the developments which have been made, it is no longer necessary to hospitalize intracapsular fractures for a long period of time, nor to use walking calipers, casts, weights or other types of splints during the convalescent period.

With this modern technique, it is now possible to use a five-inch nail paralleling and in contact with the anterior medial cortex of the neck for intracapsular fractures for all cases in adults. Directors, levels and mechanical means for the placement of the nail will not compensate for lack of knowledge of the anatomy of this region.

Nailing intracapsular fractures in a coxa valga position assures earlier union and a near-normal length of limb.

Those practicing the technique must be consistent, as such variations as not placing a patient on a fracture table, completing the reduction in the lateral view and restoring the angle of declination will result in complete failure.

The majority of patients with fresh fractures may be discharged from the hospital within 10 days.

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Industrial Dentists Meeting
—October 15, 1944—

THE FIRST Annual Meeting of the AMERICAN ASSOCIATION OF INDUSTRIAL DENTISTS is being held at the Stevens Hotel, Chicago, Sunday, October 15, 1944, beginning at 9:00 A.M., with scientific presentations as follows:

"Adequate Facilities for an Industrial Dental Program" — DALE M. NEEDHAM, D.D.S., Director of Dental Department, Jack & Heintz, Inc.

"The Role of the Industrial Dentist in Employee Health Conservation"—EARLE H. THOMAS, M.D., D.D.S., L.L.D., Chicago Transit Company.

"Dental Society Sponsorship of Industrial Dentistry"—GLENN E. CARTWRIGHT, D.D.S., President, Dental Hygiene Institute, Chicago Dental Society Affiliate.

Group Discussion on Industrial Dentistry—C. R. FRICKE, D.D.S., Presiding.

Hydrogen Sulfide Formation

—In Sewage Treatment Plants—

P. D. HALLEY, *Industrial Hygienist*, and
C. S. McKINLEY, *Director*,
Bureau of Industrial Hygiene,
West Virginia Department of Health

THIS brief report is presented because it is generally believed that only small amounts of hydrogen sulfide are found in sludge digestor gases of sewage treatment plants. Hydrogen sulfide is generally considered from a nuisance standpoint only and it is often overlooked as a potential health hazard.

Hydrogen sulfide results from the bacterial decomposition and reduction of sulfur bearing organic matter and sulfates in the absence of free oxygen.

Sulfur is always present in sewage although it varies considerably in quantity according to its source. Sulfur in sewage may be derived from any one or all of the following:[1]

1. Vegetable or animal organic matter. Many of the proteins contain sulfur.
2. Sulfates of calcium and magnesium often found in water supplies and often present in large quantities in ground water that leaks into sewers.
3. Sulfates, sulfites, and sulfides of the alkalies, alkaline earths and heavy metals that are present in some industrial wastes.

The hydrogen sulfide produced from vegetable or organic matter and from calcium and magnesium sulfate in water supplies is generally rather small. It is frequently the case, however, in industrial wastes carrying sulfates, sulfites, and sulfides, to find a rather large amount of total sulfur. If this sulfur bearing industrial waste enters the domestic sewage treatment plant the potential source of hydrogen sulfide is great.

A recent check of two small plants designed to provide treatment of sanitary sewage from two industrial populations revealed hydrogen sulfide was formed in negligible amounts in one. In the other plant, however, the hydrogen sulfide was formed in sufficient quantities to constitute a very serious health hazard if this gas were to escape.

Further comparative study of these two plants revealed that the total sulfur content of the influent and digestor sludge in this second plant was much greater than the one with practically no hydrogen sulfide formation. This second plant was found to have industrial waste quite high in sulfur content and some of this waste was undoubtedly entering the collecting system of the sanitary sewage from the industrial population.

The accompanying table summarizes the analytical findings of the sewage sludge and gas from these two plants.

PLANT NO. I.

Type Sample	Sampling Location	Hydrogen Sulfide, PPM	Total Sulfur as PPM, SO_4
Gas	Digestor chamber	200	—
Gas	Digestor chamber	0.0	—
Gas	Digestor chamber	0.0	—
Gas	Digestor chamber	0.0	—
Water	Drinking water supply	—	76
Sewage	Intake	—	96
Sewage	Effluent	—	99
Sewage sludge	Digestor tank	—	1770

PLANT NO. II.

Type Sample	Sampling Location	Hydrogen Sulfide, PPM	Total Sulfur as PPM, SO_4
Gas	Digestor chamber	23,300	—
Gas	Digestor chamber	14,800	—
Gas	Digestor chamber	10,000	—
Gas	Digestor chamber	10,700	—
Gas	Digestor chamber	7,100	—
Gas	Digestor chamber	10,000	—
Gas	Digestor chamber	8,300	—
Gas	Digestor chamber	15,000	—
Gas	Digestor chamber	18,000	—
Gas	Digestor chamber	11,0000	—
Water	Drinking water supply	—	78
Sewage	Influent	—	563
Sludge	Digestor tank	—	20,760

Inasmuch as an atmosphere containing 1000 parts hydrogen sulfide per million parts air will cause immediate unconsciousness, the escape into confined spaces of digestor tank gas containing from 10,000 to 23,000 parts per million of hydrogen sulfide as found in the No. 2 plant would give rise to a very serious health hazard. For the control of this as well as other hazards connected with sewage treatment plants the reader is referred to a recent article by A. D. Brandt[2] and another by C. S. McKinley.[3]

For those responsible for sewage plants two methods of approach toward the analysis of sewage digestor gas for hydrogen sulfide content are as follows:

1. The U. S. Bureau of Mines has developed a detector* that provides a simple and fairly accurate means of detecting hydrogen sulfide. It is rapid in giving results and accurate enough to indicate concentrations of hydrogen sulfide ranging from those that are harmless or but slightly harmful to those immediately dangerous to life. It will indicate hydrogen sulfide in the range of 25 to 500 parts per million parts of air.
2. For a more accurate determination of hydrogen sulfide in digestor gases and particularly for the determination of concentrations of this gas that are not within the range of the hydrogen sulfide detector, it is recommended that analytical methods be employed.

The cadmium sulfide method has been found by the authors to be quite satisfactory. This method is based on the precipitation of cadmium sulfide in ammoniacal solution from some cadmium salt by the hydrogen sulfide. The amount of the cadmium sulfide is then estimated iodometrically. The amount of hydrogen sulfide may then be ascertained by calculation. For complete details on this procedure the reader is referred to the U. S. Bureau of Mines Bulletin No. 287 (1927) by Gardner, Howell, and Jones.

In actual practice, the authors have used the hydrogen sulfide detector for a preliminary estimation of the concentration of hydrogen sulfide followed by the more accurate analytical method.

Total sulfur in the sewage and sewage sludge as SO_4 was determined gravimetrically in preference to other analytical methods.

If there is no one associated with the plant who has the necessary equipment and training to undertake these studies the State Industrial Hygiene Unit may be contacted and they will be able to perform the analyses and determine the potential or actual hazard present.

Conclusions

HYDROGEN sulfide may be formed in appreciable amounts during the digestion of sewage sludge containing a large amount of combined sulfur. In planning the proper safety program for sewage plant operations hydrogen sulfide should be considered as a definite potential health hazard and not just as a nuisance as is so often the case.

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1. American Sewerage Practice; METCALF and EDDY, Volume III. Disposal of Sewage, p. 46.
2. Notes on Accident at a Small Sewage Treatment Plant Resulting in the Death of Three Workers, A. D. BRANDT: *Sewage Works Journal*, XV: 6, November 1943.
3. Sewer Gas—Hazards in Sewage Plants, C. S. McKINLEY: *Industrial Medicine* 12: 12, December, 1943.

* Manufactured by the Mine Safety Appliances Company, Pittsburgh, Pennsylvania.

STANDING (Left to Right): DR. T. LYLE HAZLETT, Westinghouse Electric & Manufacturing Company; DR. M. N. NEWQUIST, The Texas Company; DR. FRED W. SLOBE, President, A.A.I.P. & S.; DR. ROYD R. SAYERS, Director, U.S. Bureau of Mines; DR. EDWARD C. HOLMBLAD, Managing Director, A.A.I.P. & S. SEATED (Left to Right): DR. WILLIAM A. SAWYER, Eastman Kodak Company; DR. LOYAL A. SHOUDY, Bethlehem Steel Company; DR. OTTO P. GEIER, Cincinnati Milling Machine Company

Past Presidents' Committee

—American Association of Industrial Physicians and Surgeons—

THE FIRST meeting of the Past Presidents' Committee was held on October 3, 1944, at the Drake Hotel, Chicago. This committee will be composed of all Past Presidents of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS who are still active or honorary members of the Association.

Dr. Shoudy is Chairman, and the President and the President-Elect are members *ex officio*.

It is hoped that the formation of this committee will cement the Past Presidents into a group which will help mould the future policies of the Association and that the Past Presidents, individually and collectively, thus will retain close contact with the Association.

The members of this committee, having no vote, will have no political connection with the Association except as regular members. Their function, largely, will be advisory. This committee can both initiate plans and policies, referring them to the Board of Directors, or it can deliberate upon matters referred to it by the Board of Directors for advice and consideration. The liaison between this committee and the Board of Directors is through the President, the immediate Past President, the President-Elect, and the Managing Director, all of whom attend both the meetings of the Board of Directors and the Past Presidents' Committee. With the exception of the immediate Past President who automatically goes on the Board of Directors for two years, it is assumed that Past Presidents will not be on the Board of Directors since they will serve in their capacity as members of the Past Presidents' Committee.

The complete roster of the Past-Presidents of the Association is as follows:

1916-1918 J. W. SCHERESCHEWSKY, M.D., (Deceased)
1918-1920 HARRY E. MOCK, M.D., 122 South Michigan Avenue, Chicago.
1921-1922 OTTO P. GEIER, M.D., Cincinnati Milling Machine Company, Cincinnati, Ohio.
1922-1923 C. E. FORD, M.D., (Deceased)
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1927-1928 THOMAS R. CROWDER, M.D., (Deceased)
1928-1929 GUY L. KIEFER, M.D., (Deceased)
1929-1930 C. F. N. SCHRAM, M.D., Tennessee Eastman Corporation, Kingsport, Tennessee.
1930-1931 CASSIUS H. WATSON, M.D., Vanderbilt Clinic, New York City.
1931-1934 DON B. LOWE, M.D., B .F. Goodrich Company, Akron, Ohio.
1934-1935 EDWARD C. HOLMBLAD, M.D., 28 East Jackson Boulevard, Chicago.
1935-1936 FLOYD E. SHAFFER, M.D., Bethlehem Steel Company, Sparrows Point, Maryland.
1936-1937 ROBERT P. KNAPP, M.D., 357 South Main Street, South Manchester, Connecticut.
1937-1938 ROYD R. SAYERS, M.D., 2210 Russell Road, Alexandria, Virginia.
1938-1939 CLARENCE D. SELBY, M.D., General Motors Corporation, Detroit.
1939-1940 McIVER WOODY, M.D., Standard Oil Company, New York City.
1940-1941 DANIEL L. LYNCH, M.D., New England Tel. & Tel. Company, Boston, Massachusetts.
1941-1942 T. LYLE HAZLETT, M.D., Westinghouse Electric & Manufacturing Company, East Pittsburgh.
1942-1943 JOHN J. WITTMER, M.D., Consolidated Edison Company of New York, New York City.
1943-1944 HARVEY BARTLE, M.D., Pennsylvania Railroad, Philadelphia.

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Volume 13 OCTOBER, 1944 Number 10

That Arrogance

IN THE current progress of medicine there is so much of transcendent interest to physicians and surgeons that medical publications would do well to confine themselves to medical matters. This means that they should eschew politics. Ordinarily they do. But when the withering web of bureaucratic domination is floating above their field, who shall say they have not the right—and the duty—to aid as they can in brushing it away before it grows too big and settles down too tightly to be got rid of.

The web has been spun, but it is still hanging—and there is yet time. It will be wise to use that time for a little investigation, and a follow-up of serious thought. The investigation might begin with a reading of the item on page 40, from the *Bulletin of the Medical Society of the County of Kings*, entitled "Appendectomy, 20 Shillings," from which the following: "Inspectors come around regularly to inspect his records. If these fail to pass, the doctor is fined without further process of law, anything from 100 to 200 pounds. . . . More irritating is the limitation in the allowance for drugs. Only certain inexpensive items may be prescribed. . . In Kidderminster, out of a total of 13 physicians, there are only two who may operate. These are paid a small fee when they operate on a panel patient. An appendectomy nets them one pound."* This is the English picture—"art made tongue-tied by authority, and folly, doctor-like, controlling skill." It is not pretty. But it was intended to be made also the American picture. Who intended it? And why? The answers will be part of the follow-up of thinking which it is hoped every member of the medical profession has been, and is now, doing.

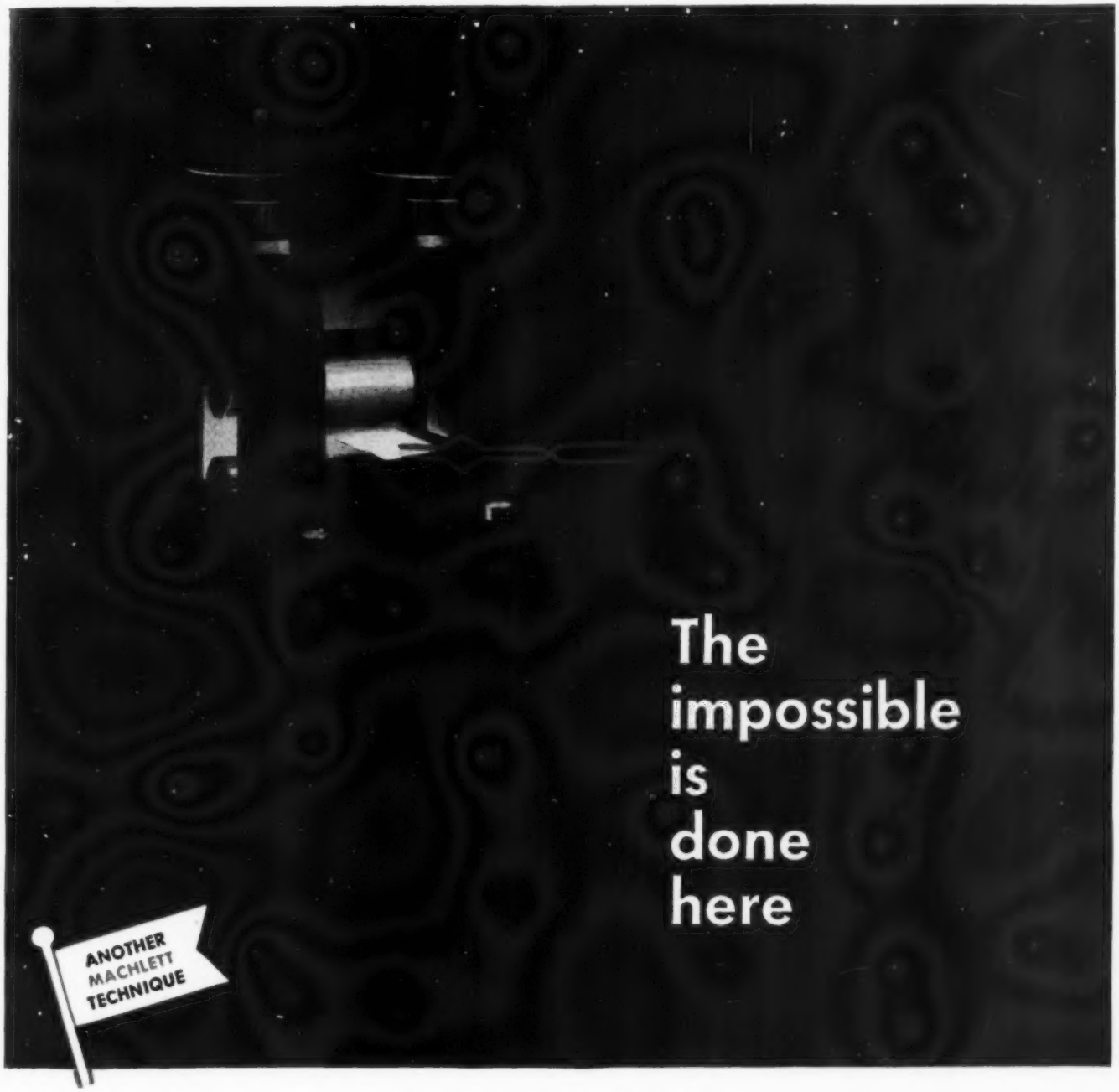
The bill submitted to Congress for the complete governmental control of medicine, under a dictatorial bureaucracy, was the high point in a career of administrative arrogance. This career began with the sending to Congress of "must" legislation. It was echoed in the halls of the mighty by such expressions as the one attributed to Harry Hopkins that "the public is too damn dumb" and the other, by certain self-styled "experts," that the average intelligence of the American people is that of a 12-year old child. And it finally reached the point where the career incumbent, "having both the key of officer and office, set all hearts i' the state to what tune pleased his ear."** In the Federal control of medicine, it is more than a nuance of the tune that several hundred thousand administrative jobs were to be created—and filled, of course, by "the faithful."

There was in England the argument in behalf of the plan there that "a just table of rewards would be provided by the state." In England the "just" reward allows about $4.00 for an appendectomy. One has only to impose the English picture upon his own practice to realize the devastating effect on everything American that would ensue here from the kind of medical control implicit in the Wagner-Dingell bill. This has, to be sure, the *promise* of "just reward" for the American doctors, to be fixed, of course, by the bureaucrats. But careful study of the bill and its supporting arguments discloses that this promise is merely "sooth for simple souls," the sugar in a flood of propaganda broadcasts which could all be grouped under the title of contributions to that decade-old program, "Weewee the People."

CONTRAST the devious double-entendre of the Wagner-Dingell proposals and their background with the forthright appeal in the other item on page 40 entitled "Medical Leadership." A man whose record consists of promises made to be kept, and kept in both the letter and spirit of their making, asks us to "enlist the leadership and aid of the doctors of America in organizing our private and public hospitals as well as our other services into a fully effective system to protect the health of all our people." This is an appeal to *leadership*, as opposed to the Wagner-Dingell compulsion of partisanship. The example of the doctors of occupied Holland, in refusing to practice their profession under the armored orders of the Nazi Gestapo is exhilarating to every lover of liberty.

*See also—New Zealand, where (page 850): "In this country the Workers Compensation Act allows the doctor £1 as remuneration for treating an injured workman."

**According to Stanley High (*Saturday Evening Post*, September 30, 1944), between March 14, 1936, and June 29, 1944, the Federal Register printed a total of 76,541 directives, grants, orders, permissions and prohibitions—93,000,000 words in 62,202 pages. "Government rules dictate styles in women's hosiery; decree one button, where formerly there were two, on bib overalls; prescribe the manufacturing processes for hot-water bottles; define roast beef and indicate how it must be carved; prohibit whiskers beyond a certain length for department store Santa Clauses." It is not yet written that "government rules dictate" the form, time, place, extent and kind of medical and surgical practice to be engaged in by the physicians and surgeons of America, but, with the Wagner-Dingell intendments in mind, who can doubt that such "government rules" in medicine are so imminent that—in the matter of heading them off—*"it is later than you think."*



This simple operation is the final proof that Machlett has succeeded in producing malleable beryllium, for here that metal is being rolled into sheets from 0.004 to 0.020 inch thick, sheets that are vacuum-tight, and have adequate ductility at high temperatures. Such properties were once considered impossible to realize.

Why was it important to produce the metal in this rare form? Because beryllium was known to be remarkably transparent to X-rays, and if it could be used as a window in the tube envelope, a great improvement would be made in tubes for several important applications — particularly X-ray diffraction. One such application is determining the axes of quartz crystals (important in war radio); there are manifold similar vital technical uses in metallography.

So Machlett did the impossible — beryllium was made malleable. Details are to be found in a scientific paper, copies of which will be sent on request.

Such an achievement is typical of the Machlett determination to overcome even the greatest obstacles to the production of the most effective and desirable types of vacuum tubes, whether they be X-ray tubes for medical, dental, industrial or scientific purposes, or are radio tubes for communications or induction heating. When you see the Machlett name, remember that it was the policy of making the best possible product that made us the world's largest manufacturer of X-ray tubes . . . Machlett Laboratories, Inc., Springdale, Connecticut.

Machlett Diffraction Tube with beryllium window. Used in analyzing quartz crystals for war and other radio purposes, and in metallography.

MACHLETT
X-RAY TUBES SINCE 1898
TODAY THEIR LARGEST MAKER

Its effect, however, should persist beyond emotional admiration; the European fact that such control was attempted with steel-and-bullet authority there should emphasize the American fact that similar control is now being attempted with law-and-bureau authority here. The present difference between the European fact and the American fact is vastly greater than the difference between executions for disobedience and fines for non-compliance. It goes clear down to the deep roots of the principles of American institutions as distinguished from European institutions. And the inevitable ultimate development of the subtle erosion that is gnawing at those roots here is exemplified in the Gestapo there. . . .

In short, whatever expansion of medical care is necessary here *can* be led and controlled, and *should* be led and controlled, by the medical profession. It is more than too bad, it is dangerous, that the medical profession has been put on the defensive in respect of this leadership and control by the politicians. But, as we have said, "there is yet time. . . ."

We have the right to feel as we do. And we believe we have also the duty to say what we feel, and that possibly we can, and certainly we should, attempt to aid a little in forestalling the Wagner-intended counterpart of the English "inspectors," and the Nazi Gestapo, in this country, by urging every reader to *vote*. How he votes is (still) his own business. We count, however, on his inborn and freedom-nurtured respect for his own personal dignity as (still) a free and sovereign *American* citizen.

The Pre-placement Patch Test

PERUSAL of current literature and discussions on the status of the pre-placement patch test leads to the belief that there is considerable difference of opinion as to the practicability of this kind of test for industrial employees. Where a marked difference of opinion persists on any subject, one is tempted to conclude that there is either insufficient information available from real scientific experience, or that experiences have varied so greatly that it has been difficult to reach a basis of agreement. How much of one and how much of the other is present in this instance is incapable of present estimation; the differences, meanwhile, remain deep-seated.

It would seem, however, that a middle ground is the best position to take: the pre-employment skin patch test is neither best used on all employees where there is an exposure to skin irritants, as a reliable measure of detecting sensitivity; nor should it be entirely dismissed as useless in all respects.

The skin patch test at any time is obviously a test which should be made only under certain specific conditions, by skilled observers who have had enough experience so that the results will be sound. In this respect the pre-placement skin patch test is probably no different from any other diagnostic medium in the armamentarium of industrial medicine; it needs no more or no less care in adaptation than a considerable number of other procedures which are useful under some circumstances and obviously useless under others.

DR. KEIL, in his article on page 860, in referring to quantitative tests such as those performed by Wedroff, says: "There are not sufficient statistics available on the course of those who show positive patch tests, particularly in the absence of clinical manifestations, and, were such available, these would have to be correlated carefully with the actual conditions of exposure." If we were to emphasize any one sentence in DR. KEIL'S article which we feel is significant, that would be it, although we realize that it is obviously unfair to quote a single sentence from an entire article and have it express a competent opinion. Nevertheless, this is quoted for what it may be worth.

Not attempting to discuss the details, for which reference should be made to the article, in summary the special circumstances under which the pre-placement patch test or its equivalent may be used to good advantage in industry, according to DR. KEIL, are:

1. To eliminate instances of "latent" hypersensitiveness. By this is meant cases which are hypersensitive to a chemical or substances shown by the patch test but which have no clinical significance to the allergen in question at the time of the examination, because there has been no contact or an inadequate contact with the allergen.

2. To apply the principle of group reactions in determining which industry or which occupation or group the worker should avoid.

3. To determine whether a substitute should be used in place of the allergen which caused the dermatitis.

The circumstances under which the pre-placement patch test may not be valid are, according to DR. KEIL:

1. In industries where the worker is handling substances of high allergenic potency.

2. The test should not be used to determine degrees of primary irritation, because it was never meant to be employed for this purpose.

3. The test cannot be used at the present time for determining the possibility of future hypersensitiveness to a substance.

4. It is questionable whether patch tests should be carried out with complex materials, unless the observer has a good idea of the nature of the ingredients.

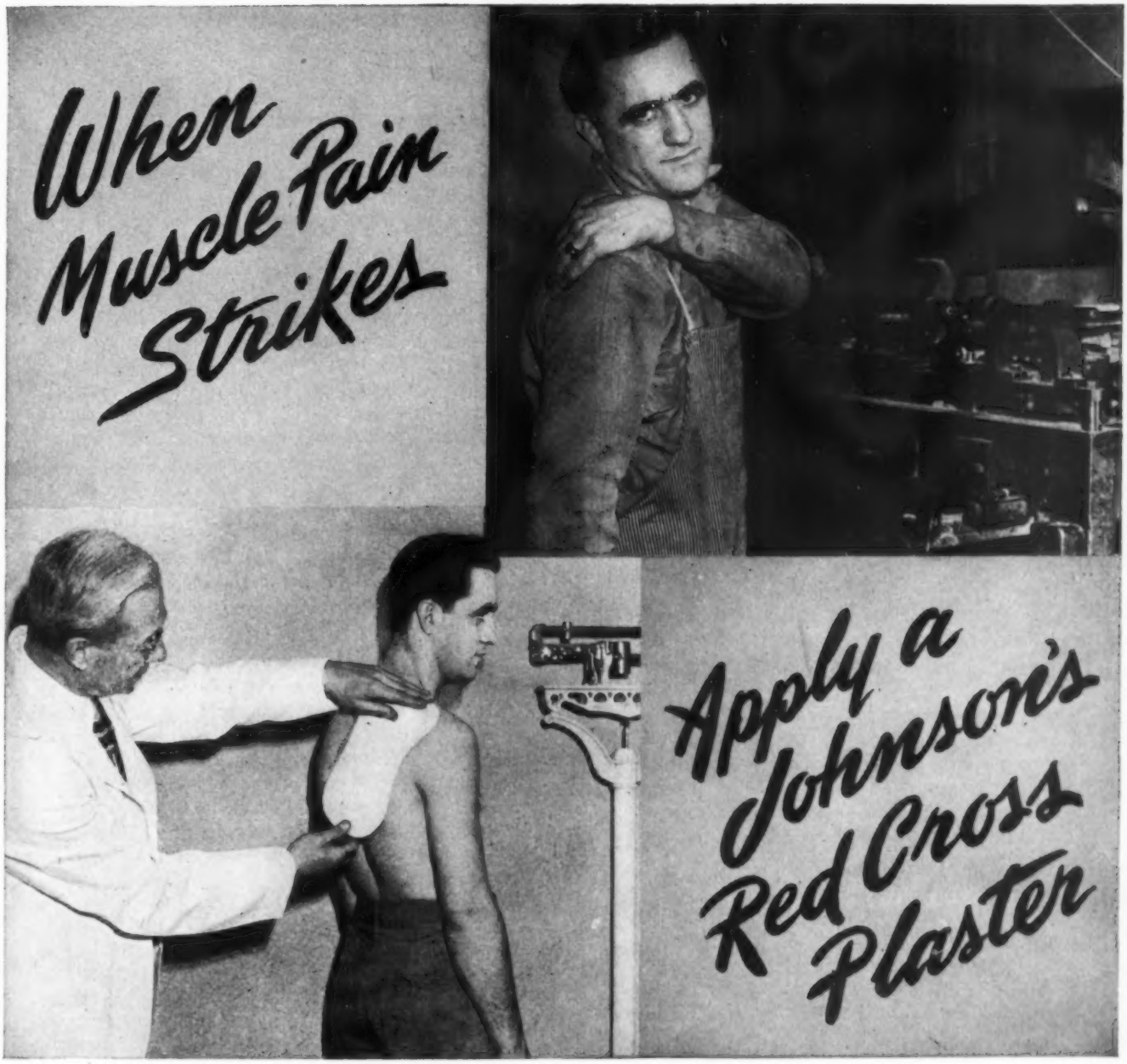
5. When industrial processes become fully mechanized, the value of the patch test in industry will probably diminish to some degree.

If one were to formulate an opinion from the statements and discussions which are presently available, it would probably be to the effect that a great deal more work needs to be done with the pre-employment patch test before it may be readily accepted as a general diagnostic measure, and that at the present time it is a specific type of reaction which needs careful application and good judgment and experience in its interpretation—in which it differs nowise from a great many other similar procedures.

DR. KEIL'S presentation here is the kind that would be freely and interestingly discussed if it were given at a meeting. By way of equivalent of such discussion, it was submitted to a number of experts in industrial dermatology, and the consensus of their opinions—and arguments—follows the article. The invitation to still more—of both opinions and arguments—is implicit.

"Let Him Hear"

THE article on "Hearing Injuries in Industry" which appeared in our September number presented frankly and squarely a problem which industry inevitably must handle. Tired ears get no relief when



Johnson's Red Cross Plaster often affords sufficient relief in the simple forms of muscular aches, muscle congestion and fatigue for these reasons. Retains and adds to body warmth. Provides pressure and support. Applies mild medication and covers affected area with flannel. Gives constant passive massage. Counter-irritant action stirs up circulation.

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●

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The American Society for the Hard of Hearing has been aware of this problem for many years. Its committees on noise in industry and insurance have been urging manufacturers to protect the hearing, as well as the eyes, of their workers. The Society this year is observing its Silver Anniversary. Its members are engaged heavily in their particular war obligations by assisting in the rehabilitation of soldiers and sailors whose hearing was injured in battle. They did this in World War I, at which time the need for unified service convinced its founders that a national society was essential to rapid progress in hearing conservation. Improvement in hearing aids, marked spread of audiometer testing in public schools, earlier discovery and more prompt treatment of hearing defects, and rehabilitation of the adult deafened have been instigated and encouraged by the Society. Scientific progress and greater public awareness of the hard of hearing person and his problem foretell the golden age of hearing.

Disability as a Dental Sequel

LON MORREY, D.D.S., of American Dental Association, puts into interesting and forceful words (page 777) the importance of dental health in industry. The damage that may be done to the teeth and mouth by objective hazards—dusts, gases, acids—"depends, to a great extent, on the kind of mouth they enter. If it is clean and free from tooth decay the dust, gas and acids may do little harm." The trouble with the dental situation in industry, however, is that the objective hazards are nowhere near as serious as the subjective, where the damage from the subjective—uncleanness, infections, decay—depends also on the kind of mouth they are in. In the mouth of a self-respecting, normally-inclined and reasonable person they have a better chance to be eradicated before the individual gets too far along toward one or more of the many ultimate disabilities which have their genesis in mouth conditions. Every physician and dentist knows, and many have repeatedly written, of the relation between mouth infection now and disease later. DR. MORREY confirms: "Arthritis, neuritis, chronic infections of the gastro-intestinal and urinary tracts, eye infections, anemia and general debility often have been traced to infections about the teeth." But too often the individual doesn't know this; or won't heed it properly when told. Dental education, therefore, is of primary importance. It should have a leading place in all health education programs, both in and outside of industry. As a matter of the industrial physician's ability to contribute to dental education he will be vastly helped as he is the more informed on case histories of the definite relation between disabilities now and dental conditions some time since. He can then *effectively* and *specifically* illustrate the future from the past. Who, therefore, has actual data, case histories or examples in his practice, of a definite proved relation between present disability, either occupational or non-occupational, and previous or present dental conditions? These should be published.

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Acute Sub-Deltoid Bursitis

—Experiments with Iron Cacodylate—

LOUIS PELNER, M.D.,
Assistant Visiting Physician, Long Island College Hospital,
Brooklyn Cancer Institute,
Gastroscopist-Beth Moses Hospital,
Associate Physician, Greenpoint Hospital,
Brooklyn, New York

SUB-DELTOID bursitis is the commonest disease of the shoulder joint.[1] It is reputed to cause at least 80% of painful shoulders. Other causes of painful shoulders are arthritis of the shoulder joint which accounts for about 5%, and myofibrositis which accounts for approximately 10%. Neuritis is considered to be a very infrequent cause of pain in the shoulder.

Etiology

THE supposed etiology is remarkedly varied. Probably acute and chronic traumata are the most important factors. Another element which looms large in the possible causation is exposure to drafts. Many patients give a history of driving with the arm exposed to a draft from an open windshield. One author[2] believed that glandular dysfunction may lay the groundwork for the invasion of bacteria. In another study of 200 cases,[3] 32 had definite metabolic disturbances, e.g., hyperthyroidism, diabetes, or hypothyroidism.

Anatomy

THE sub-deltoid bursa lies over the greater tuberosity of the humerus and underneath the proximal portion of the deltoid muscle. The tendon of the supraspinatus muscle is inserted in the head of the humerus near the sub-deltoid bursa. It varies in size, and is probably continuous with the sub-acromial and subcoracoid bursae.

Pathology

THE usual pathology is stated to be an inflammation in the general region of the sub-deltoid bursa, with more-or-less frequent calcification in the tendons of the supraspinatus muscle. This latter finding is not a primary pathological state, but probably compensatory due to lack of treatment of the initial condition.

Symptoms

THIS is one of the most painful conditions in medicine. The pain is so severe that morphine is not too powerful a sedative for a patient with acute subdeltoid bursitis. There is excruciating pain in the shoulder joint, which is aggravated by movement, especially abduction and rotation. Swinging the arm forward does not cause pain. There may be radiation of pain to the neck, arm, forearm, and even to the finger-tips. This latter radiation is often confused with neuralgia, and vitamin B_1 is usually given without effect. Two almost pathognomonic signs of subdeltoid bursitis are the inability of the patient to place the palm of his hand on the occipital region of his head, and the inability to place the dorsum of his hand on the small of his back. These motions require abduction and rotation.

X-ray examination reveals calcification of the supraspinatus tendon in about 40-50% of the cases, when first seen. The calcification is found in those who have had the condition for weeks or months.

Therapy

THE treatment varies markedly with each authority, and consists of irrigation of the bursa with saline,[1] needling the bursa,[4] aspiration of the bursa,[5] and procaine injections.[1] Local diathermy[6] and ionization[7]

Battle behind the lines

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with mecholyl or magnesium sulphate solution also have their proponents. X-ray therapy has been used with apparent success.[8] The calcified type is treated by curettage of the bursa through a surgical incision. Dick and his co-workers[9] have recently been able to dissolve the calcium in the so-called calcified sub-deltoid bursitis by long-continued administration of ammonium chloride by mouth. A low calcium diet would appear to be a requisite for this treatment. It is probably analagous to the removal of lead and calcium from the bones in the de-leading process.

A relatively neglected form of therapy is the intravenous injection of 5 cc. of iron cacodylate into the antecubical vein of the forearm. Only one communication appears in the literature on this extremely simple and effective method.[10] It has proved so effective in our hands over a period of many years that, if there is no relief immediately on completing the injection, two possibilities exist: either the diagnosis is not acute sub-deltoid bursitis, or there is calcification of the supraspinatus tendon present as a complication. Thus it may be used to diagnose the condition.

In typical acute sub-deltoid bursitis of recent origin, there is an immediate increase in the range of motion and relief of pain upon the intravenous injection of 5 cc. of iron cacodylate (1 grain). The relief is so dramatic that it often appears to be due to psychotherapy. However, close observation of 75 patients over a five-year period, shows that this is not a form of psychotherapy, but an actual practical treatment and diagnostic aid. These results are not found where there is calcification of the supraspinatus tendon.

Seventy-five cases over a period of five years were treated with this method. The results were invariably good when the condition was present from several days to several weeks. Failure usually meant a wrong diagnosis or that calcification was present. Under these conditions other methods had to be used. From two to five or more treatments were usually necessary at three-day intervals, but the patient almost always achieved immediate temporary relief. However, the pain often returned, although in a much more moderate form. Morphine did not give these people as much relief as did iron cacodylate. The spectacular fashion in which this medication works makes it appear almost incredible. The rationale is not known. Certain experiments indicating the possible mechanism of action concerns the second part of this paper.

Toxicity

THE toxicity of iron cacodylate is considered negligible. It has been used as a hematinic for many years, an indication for which it was obviously useless, because of the small amount of iron that could be injected.

One patient developed a large hemotoma of the hand, a platelet count of 120,000 and absence of clot retraction for about 12 hours, following one injection of iron cacodylate (1 grain). Twenty-four hours later, the platelet count rose to 200,000 and the clot retraction was again normal. The patient's history revealed the following significant findings: healed tuberculosis of the lung and menorrhagia, without evident pathology, for the preceding six months. It was thought possible that the menorrhagia was due to latent thrombocytopenic purpura, but unfortunately no platelet count was taken before injection of iron cacodylate, so that comparison could not be made. It might be postulated that in this patient, iron cacodylate brought out temporarily a latent purpura. The patient recovered promptly from both sub-deltoid bursitis and her anomalous bleeding.

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Experiment

IT IS apparent that for an injection to work as rapidly as with iron cacodylate, there must be some physicochemical change in the blood resulting from the injection. Following the experience noted immediately above, it was decided to attempt to fathom a possible mode of action of this substance. It was thought possible that iron cacodylate could temporarily diminish clot retraction of the blood. What effect this finding would have, if true, on the pathology of sub-deltoid bursitis is not immediately obvious. However, I feel that the observations are worth recording for whatever clue they can offer to students of this condition.

(a) Iron cacodylate, 0.2 cc., (1 grain in 5 cc.) was added to 5 cc. of whole blood. The blood clotted within two to six minutes. The initiation of clot retraction was markedly delayed, and in most cases entirely inhibited. The retraction, if present, was usually delayed for about 15 to 20 hours.

(b) Ferric citrate, 0.2 cc., was added to 5 cc. of whole blood. There was no inhibition of clot retraction.

(c) Sodium cacodylate, 0.2 cc., was added to 5 cc. of whole blood. Clot retraction was delayed beyond that of normal, but began usually in from four to five hours. Normal retraction begins within one to two hours.

(d) It was found that several milligrams of methionine would cause a normal clot retraction even though iron cacodylate was added to the blood. Thus methionine appeared to antagonize the anti-retraction effects of the iron cacodylate.

Rabinowitz[11] found that he could restore the clot retraction in purpuric blood by adding the amino acid, methionine, to blood before coagulation occurred. He has also used methionine in vivo for the treatment of thrombocytopenic purpura with good results. For that reason it was important to see if methionine also would produce this effect in blood to which iron cacodylate was added. This proved to be true.

Iron cacodylate, 0.2 cc., and several milligrams of methionine were added to whole blood. Coagulation resulted within two minutes and retraction started in one hour.

It is interesting to speculate on the possible mode of action of iron cacodylate in inhibiting clot retraction. Since methionine or a similar substance appears to be necessary for clot retraction in purpuric blood,[11] it probably is the substance that is present in normal blood that induces clot retraction.

A comparison of the following formulae might give a clue as to the possible mechanism by which iron cacodylate inhibits the action of the methionine that is present in normal blood.

Ferric Cacodylate: (Iron Cacodylate):
$Fe[(CH_3)_2ASO_2]_3$

Sodium Cacodylate:
$Na(CH_3)_2ASO_2$

Ferric Citrate:
$FeC_6H_5O_7 \cdot 5H_2O$

Methionine:
$CH_3 \cdot S(CH_2)_2CH \cdot NH_2 \cdot COOH$

It is possible that the action of methionine is partly by virtue of its methyl group. All the substances listed above except ferric citrate, which has no effect on clot retraction, have free methyl groups. For example, iron cacodylate has six methyl groups, while methionine has only one. It is possible that iron cacodylate competes with methionine because of its larger number of methyl groups, but cannot cause final clot retraction because of the lack of other important groups, e.g., S or NH_2. A similar mode of action is suggested for the effect of sulfanilamide in the inhibition of

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bacterial growth. It is supposed to compete with para-amino benzoic acid which is necessary for bacterial growth and reproduction. Thus the bacteria unwittingly take the substance that is detrimental to their welfare.

In the experiments quoted above, additional methionine added to the blood finally overcomes the effect of the methyl groups of the iron cacodylate.

Iron cacodylate may produce a temporary inhibition of clot retraction when given intravenously in the treatment of sub-deltoid bursitis. Whatever action it has in this condition must be of an exceedingly dramatic nature. If the exact pathology of acute sub-deltoid bursitis were known, it might be possible to connect two apparently unrelated phenomena.

Summary

IRON cacodylate intravenously has given great promise in the diagnosis and treatment of sub-deltoid bursitis. Although its essential mode of action is unknown, it appears to be due to a physico-chemical change in the blood.

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Medicine and Surgery in Utah

—The Fiftieth Annual Meeting of the Utah State Medical Association, Salt Lake City, Utah, August 25-26, 1944—

Reported by

C. O. SAPPINGTON, M.D., Dr. P.H.

NEW discoveries by medical science since the war, responsible for reducing the death rate on the home front as well as on the battle fronts, were discussed by leading medical men in army and civilian life at the Fiftieth Annual Utah State Medical Association Convention, Friday and Saturday, August 25 and 26, in the Union Building of the University of Utah, Salt Lake City.

Preceding the opening of the convention on Friday at 9:00 A.M., the House of Delegates met Thursday at 7:30 P.M. electing officers, the new President-Elect being DR. E. R. DUMKE, of Ogden.

The industrial papers on the program were presented by DR. LEROY U. GARDNER, of Saranac Lake, New York, on "Silicosis" and on "Tuberculosis in Industry"; and by DR. C. O. SAPPINGTON, of Chicago, on "The Meaning of Industrial Medicine, Hygiene and Health," and on "Medicolegal Aspects of Industrial Practice."

DR. LEROY U. GARDNER, in discussing "Silicosis," stated that, while it is true that silicotics are more susceptible to tuberculosis, not more than 25% of those who are exposed to silica dust will acquire the condition known as silicosis. In other words, the development of silicosis is not an inevitable reaction among those who work in this kind of dust, but whether silicosis is contracted depends upon individual reactions.

Diagnosis involves three essential factors, no one of which can be disregarded, although at times they are difficult to elicit:

1. A history of exposure to excessive concentrations of dust over a period of years.
2. Demonstration of characteristic changes in a chest roentgenogram.
3. A physical examination often marked by findings that are trivial in comparison with the extent of abnormal x-ray shadows.

There are no characteristic symptoms of silicosis, and a cough may be due to an irritation of the bronchial tubes, but definitely it is not an indication of lung nodulations. While there is a high incidence of both bronchitis and tuberculosis among silicotics, persons with silocosis are not more subject to lobar pneumonia than others.

Treatment of any pneumoconiosis is prophylactic. As engineering control reduces industrial dust concentrations this group of diseases should become rarer. There will probably always be a few persons with inherently deficient upper respiratory protection who will develop a certain amount of pulmonary reaction. Others whose lungs are damaged by previous infection will also react precociously. Medical control in industry will see that such persons are not permitted to expose themselves to dust.

Against free silica, aluminum dust inhalation offers good prospects of prophylaxis. It is apparently safe—at least in the absence of pulmonary infection. If enough aluminum is inhaled it will absolutely neutralize the effect of quartz. It will not cause pre-formed, mature silicotic nodules to disappear, but early tissue reactions resolve and further progression ceases. Aluminum therapy in fully developed cases of silicosis is said to afford symptomatic relief, although actual physiologic improvement is limited to a small proportion of the cases that have been studied. Aluminum inhalation must never be permitted to replace good hygienic control of the work places; its greatest use is to prevent progression of silicosis in men who already have early disease but wish to continue at work in their present jobs.

Suggestions given to physicians by DR. GARDNER were as follows:

1. Don't diagnose silicosis merely on the basis of employment in an industry where silica dust is present; satisfy yourself that the patient has been exposed to enough dust to cause the condition.
2. Don't diagnose silicosis in men exposed to dust for only a few months. It takes five, 10, or even 20 years of exposure to produce the disease, even where large amounts of dust are present. An exception might be where men are exposed to heavy sand-blasting with siliceous materials.
3. Don't diagnose silicosis unless the x-ray shows the characteristic nodulation uniformly distributed throughout the lungs. Even though this pattern is present, silicosis should not be diagnosed unless the physician is satisfied that the patient has been exposed to free silica dust. Other conditions may produce a nodular type of change which is benign and causes no impairment of function.

DR. GARDNER, in giving his second paper on "Tuberculosis in Industry," referred particularly to the Symposium on Tuberculosis in Industry in June, 1941, which was sponsored by the Trudeau School of Tuberculosis, Saranac Lake, and the proceedings of which were published by the National Tuberculosis Association.

Chest x-rays of all persons inducted into the army and navy will apparently cut down to a new low the incidence of tuberculosis in the armed forces.

Despite crowded conditions and mass migrations among our civilian population, no noticeable increase in tuberculosis has been detected in the country since Pearl Harbor. Lack of proper food and other unfavorable conditions in Europe, however, probably have caused appalling increase in the disease there.

Although the tubercle bacillus was isolated in 1882, no specific for killing the bacteria within the human body without injuring the human has yet been discovered. Treatment hinges upon early discovery of the disease and building up bodily resistance.

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Only general ideas are usually stated in the literature about resistance. The role of nutrition is not well understood. It often happens that trouble is assigned to the job by the worker, although industry spends much money on the protection of its workers.

Of the environmental factors, that all-embracive one, designated as the standard of living, is universely accepted as significant. Of all the accessory environmental factors peculiar to industry, only free silica is accepted without challenge. Of the other environmental factors, fumes and gases, lead absorption and intoxication, high temperature and humidity, radiant heat, and fatigue, none can be directly accused as having a definitely unfavorable effect upon the incidence of tuberculosis in industrial employees.

DR. C. O. SAPPINGTON, in discussing "The Meaning of Industrial Medicine, Hygiene and Health," stated that industrial health had its origin in antiquity, citing the studies of Plato, Pliny, Hippocrates, Galen, Ellenbog, Paracelsus and Ramazzini. Particular attention was drawn to the first book published in America, in 1837, "On the Influence of Trades, Professions, and Occupations in the United States, in the Production of Disease," by Dr. Benjamin W. McCready. Recently this material has been reprinted by the Institute of the History of Medicine of Johns Hopkins University (1943).

Industrial health is the broadest term that has ever been used to designate the methods and practices aimed at the supervision and maintenance at a high level of personal health among industrial workers. The complexity of the field is thus obvious, particularly when it is realized that any factor which may adversely affect health becomes a problem for concern and investigation. It should be noted that the essence of industrial health lies in the *prevention* of trouble. This conception necessarily broadens the field of approach and the application of industrial health procedures, which are many and of various kinds.

In our classification the structure of industrial health includes:

1. Industrial health administration.
2. Industrial hygiene and toxicology.
3. Industrial medicine and traumatic surgery (particularly in their preventive aspects).

Lantern slides were used to demonstrate the procedures and appliances in the above divisions of the structure of industrial health.

Pre-placement examinations were discussed, particularly from the viewpoint of improving the procedures and techniques employed, with emphasis on more thorough and detailed examinations.

Scientific placement was discussed, with reference especially to considering the capabilities of the individual and fitting them to various occupations by means of job analyses. As recent examples of the development of scientific placement, the modern visual program in industry was cited, particularly with regard to the determination of visual requirements of different jobs, and the examination of individuals whose visual performances conform to such requirements, as to their being thus allocated; together with the work done by the War Manpower Commission of Region XII in cooperation with the Permanente Foundation of Oakland, California, where occupational placement studies were made on the subject "Physical Demands and Capacities Analysis."

Industrial hygiene engineering, with various instruments which were illustrated by lantern slides, and methods of control, also illustrated, was discussed as an integral part of industrial health procedures.

Other preventive measures, such as periodic re-examinations, dispensary service for minor illness and injury, supervision of the correction of physical defects, health educational methods, industrial feeding and nutritional programs, were also mentioned.

Case-finding programs were designated as being on the borderline between preventive and curative measures, applying more especially at this time to tuberculosis, venereal disease, heart disease, and the like.

It was concluded that there are numerous benefits to labor, management and medicine in a program of industrial health; that an unusual opportunity is presented for private practitioners, both in general practice and in the specialties, to assist industry in keeping up the health service program, conducting such activities either at their own private offices (which will help a great deal) or making regularly scheduled visits to plants and plant dispensaries, inspecting plant processes and operations (which is much the best method).

DR. SAPPINGTON, in his second paper "Some Medicolegal Aspects of Industrial Practice," restricted his discussion to the medicolegal aspects of occupational diseases.

With the increase in the number of states passing legislation for the compensation of disability due to occupational diseases, has come the stimulation of scientific interest and effort, not only with respect to the diagnosis and evaluation of disability from occupational diseases, but, what has been found more important, a more critical application of sound information with respect to etiology. This latter phenomenon has been associated with the development of industrial hygiene engineering principles and the application of these, both in prevention and in investigations.

It is common experience that the physician in examining such cases, especially as seen in private practice, has little or no consideration for the etiological background in industry. For example, it is ordinary experience for the physician to accept the patient's statement that he was exposed to lead and, therefore, to conclude that there was a lead hazard present in the worker's occupation simply because lead was being used or handled. In all instances of this kind and similar ones, it is necessary to know the extent and severity of the exposure, so that it will be possible to know that an occupational disease could have been contracted in the industrial environment. Clearly, the employer does not want to pay and cannot be expected to pay for something that did not originate in the work place of his establishment; contraiwise, the employee is certainly entitled to compensation for disability

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Friday Morning, August 25

MEDICAL Service on Guadalcanal" (Illustrated with lantern slides)—MAJOR JOHN H. CLARK, M.C.

"Medical Administration and Hospitalization in a Service Command"—BRIG. GENERAL JOHN M. WILLIS, U.S.A.

"The Use of Tube Grafts in Deep Contracture Scars Resulting from Burns"—A. C. CALLISTER, M.D.

"The Meaning of Industrial Medicine, Hygiene and Health"—C. O. SAPPINGTON, M.D.

"Silicosis"—L. U. GARDNER, M.D.

"Neurovaccular Lesions"—ALTON OCHSNER, M.D.

LUNCHEON and Round Table Discussion, led by C. O. SAPPINGTON, M.D.; L. U. GARDNER, M.D., ALTON OCHSNER, M.D., and C. F. KEMPER, M.D.

Friday Afternoon

EXPERIENCES in the AAF Convalescent Program"—COLONEL W. J. KENNARD, M.C.

"Current Views on the Diagnosis and Treatment of Nutritional Deficiency"—M. M. WINTROBE, M.D.

"Abdominal Wounds: Management and Results in the Present War"—LT.-COL. AMBROSE H. STORCK, M.C.

"Plastic Surgery of War Injuries"—CAPTAIN RADFORD C. TANZER, M.C.

"The Surgical Treatment of Peripheral Vascular Disease"—CAPTAIN LEROY J. KLEINSASSER, M.C.

"Postoperative Pulmonary Complications"—VINCENT L. REES, M.D.

Saturday Morning, August 26

REPORT of Delegate to the A.M.A."—JOHN Z. BROWN, M.D.

"Treatment of Lateral Sinus Thrombosis with Utilization of Penicillin"—CAPTAIN FLOYD J. PUTNEY, M.C.

"Otitis Media"—MAJOR HAZEN B. DAINES, M.C.

"Osteolyelitis of the Skull: Its Treatment with Penicillin and Repair of Defects with Tantalum Plate"—MAJOR MAX T. SCHNITKER, M.C.

"Treatment of Certain Types of Urinary Obstruction"—LT.-COL. LEANDER W. RIBA, M.C.

"Treatment in War Psychiatry"—LT.-COL. LAUREN H. SMITH, M.C.

LUNCHEON and Round Table Discussions, led by LT.-COL. LAUREN H. SMITH, COLONEL LEANDER W. RIBA, CAPTAIN FLOYD J. PUTNEY, MAJOR HAZEN B. DAINES and MAJOR MAX T. SCHNITKER.

Saturday Afternoon

TUBERCULOSIS in Industry"—L. U. GARDNER, M.D.

"Medicolegal Aspects of Industrial Practice"—C. O. SAPPINGTON, M.D.

"Indications for the Use of Various Intravenous Solutions"—MAJOR CLYDE S. ROOF, M.C.

"Program of Occupational Rehabilitation in Relation to Medicine"—LT.-COL. JOHN J. LOUTZENHEISER, M.C.

"Use of Abilities and Skills in Morale and Rehabilitation"—MAJOR JAMES R. PATRICK, AGD.

NOVEMBER 14, 1666...

DR. SAMUEL PEPYS, in his famous diary, wrote: "*Here Dr. Croone told me that at the meeting at Gresham College tonight, there was a pretty experiment of the blood of one dog let out, til he died, into the body of another on one side, while all his own run out on the other side. The first died upon the place, and the other very well and likely to do well. This did give occasion to many pretty wishes, as of the blood of a Quaker to be let into an Archbishop and such like; but, as Dr. Croone says, may if it takes, be of mighty use to man's health, for the amending of bad blood by borrowing from a better body.*"

DR. PEPYS' notation that transfusion "may if it takes, be of mighty use to man's health" was surely prophetic, for today it is of tremendous therapeutic importance.

But the difficulties of typing and cross-matching where immediate transfusion is necessary pointed to a need for an acceptable blood substitute. Blood plasma was the substitute of choice and now, because dried plasma is not only stable and portable, but also because refrigeration is unnecessary, it is being used more and more wherever plasma is needed.

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arising from a true occupational disease if it has been work place of his establishment; contrariwise, the employer. It is believed that such principles are equitable. However, in trying to establish such relationships, there are many complicated factors arising and the same principles that have been so well applied to accident prevention, diagnosis of injury, and treatment are not so readily applied in the instances of occupational diseases.

A fundamental principle is that employment, disease and disability are to be associated in a causal relationship, as follows:

1. Do the working conditions of the employee represent an actual occupational disease hazard? (This does not mean mere exposure, but does mean that the exposure constitutes an actual occupational disease hazard.)
2. Has the employee a real occupational disease as claimed? (Here differentiation must be made from the diseases of ordinary life to which the general public is exposed outside of employment.)
3. Was the occupational disease in question contracted while working for the employer against whom the claim has been filed? (Here come into play the factors of cause and effect.)
4. Is the employee disabled from the effects of the occupational disease which he alleges to have contracted in the employment of the defendant employer? (Here diagnosis alone is not sufficient, but there must be shown a definite cause-and-effect relationship, as well as disability arising from the occupational disease alleged.)

Case types of four different kinds were illustrated by lantern slides and case histories in the original paper. These have reference to the employment exposure the existence of a real occupational disease, and the disability therefrom—any one of these factors being either positive or negative in the different case types.

In the further discussion of the medicolegal triad and its practical application, employment (etiology), disease (specific and differential diagnosis), and disability (functional and anatomical) were considered in their various ramifications and essentials.

Recent compensation experiences were given from the States of Utah, Michigan and Illinois.

There was also included in the paper a discussion of some of the recent difficulties in Utah experience, as discussed in a personal communication from COMMISSIONER OTTO A. WIESLEY, Commissioner of Workmen's Compensation for the State of Utah.

It was concluded that in order to obtain the results desired by commissions and by others, *specific* methods of appraisal and interpretation should be used. These may be summarized as follows:

1. Specific etiology.
2. Specific diagnosis and differential diagnosis.
3. Specific scientific methods of precision for (1) and (2).
4. Specific methods of disability evaluation.
5. Specific interpretation of this information.

Other Highlights

IN A LUNCHEON round table discussion on the first day, DRS. GARDNER, SAPPINGTON and LT.-COL. RAYMOND HUSSEY participated, with DR. PAUL S. RICHARDS presiding. Approval was given to a movement already started which may result in an educational program for Utah physicians on silicosis and other occupational diseases, some of which are now compensable under the state law.

It was also agreed by the panel that the Utah compensation law definition of silicosis is a proper one, although some changes were suggested in the wording which might improve it. Included in the discussion also was the view that it would be worth the while of industry to support an educational program on occupational diseases, to which COMMISSIONER O. A. WIESLEY, of the State Industrial Commission, said that that group would wholeheartedly give its support.

DR. ALTON OCHSNER stated that smoking may be the precipitating factor in bringing on one of the peripheral vascular diseases. To compensate for giving up tobacco, a person with one of these diseases might indulge in a daily highball with his doctor's approval. A constriction of the blood vessels characterizes this type of disease, and alcohol tends to relieve the condition.

DR. M. M. WINTROBE condemned the indiscriminate use of vitamin preparations, declaring that nature's method of providing these substances in food has never been equaled. Because of the non-use of vitamins will produce certain conditions in animals, we are not justified in concluding that it will have the same effect in man.

LT.-COL. AMBROSE H. STORCK stated that a whole blood transfusion service is now operating in the Normandy campaign. It has been found that serum is not enough where there have been large hemorrhages among the wounded, transfusions of whole blood being necessary to restore the patient.

CAPTAIN RADFORD C. TANZER discussed the means by which delicate operations by army plastic surgeons are restoring the burned and battered faces of wounded men. Unsightly scars are removed, new noses and ears are built, and pieces of scalp are transplanted to make new eyebrows where the natural ones have been burned. Sometimes it is necessary to reduce the size of the transplanted eyebrows since they may grow to great proportions.

COLONEL WILLIAM J. KENNARD stated that military authorities have learned to deal with patients suffering from battle fatigue, or operational fatigue, as it is sometimes called. Modern treatment demands care of both the brain and the body. This is begun by an interview and accomplished through what is known as "narcosynthesis," which is actually a state of partial sleep. The conscious mind can thus be masked and a psychiatric interview held with the subconscious. The highest form of medical treatment will be available to returning veterans, and at the present time neuroses figures can be set at approximately 10%. Although all men are subject to operational fatigue, some show it more than others.

LT.-COL. LAUREN H. SMITH stressed that a concentrated effort must be devoted to getting psychiatrists as close to the front line as possible in order that immediate treatment—as in the case of physical wounds—may be administered. Under combat conditions it is possible to supervise emotional shock and conflict as soon as it becomes evident and, therefore, a better prognosis can be made.

Of the various types of therapy employed in treating psychiatric cases, electro-shock has become the most successful because of its freedom from danger; this treatment consists in the passing of a controlled current from one temple to the other, thereby stimulating a transient unconsciousness.

DR. JOHN Z. BROWN characterized the Wagner-Murray-Dingell bill as "the most dangerous legislative threat to American liberty that has been presented since the Colonial period." It proposes to place the medical care of the entire population under the absolute control of governmental authorities, necessitating our acquainting the people with the hazards that have always followed in the wake of this type of practice.

MAJOR MAX T. SCHNITKER commented on the control of osteomyelitis of the skull, a previously highly fatal disease, by the use of penicillin and the repair of defects of the skull with tantalum plate.

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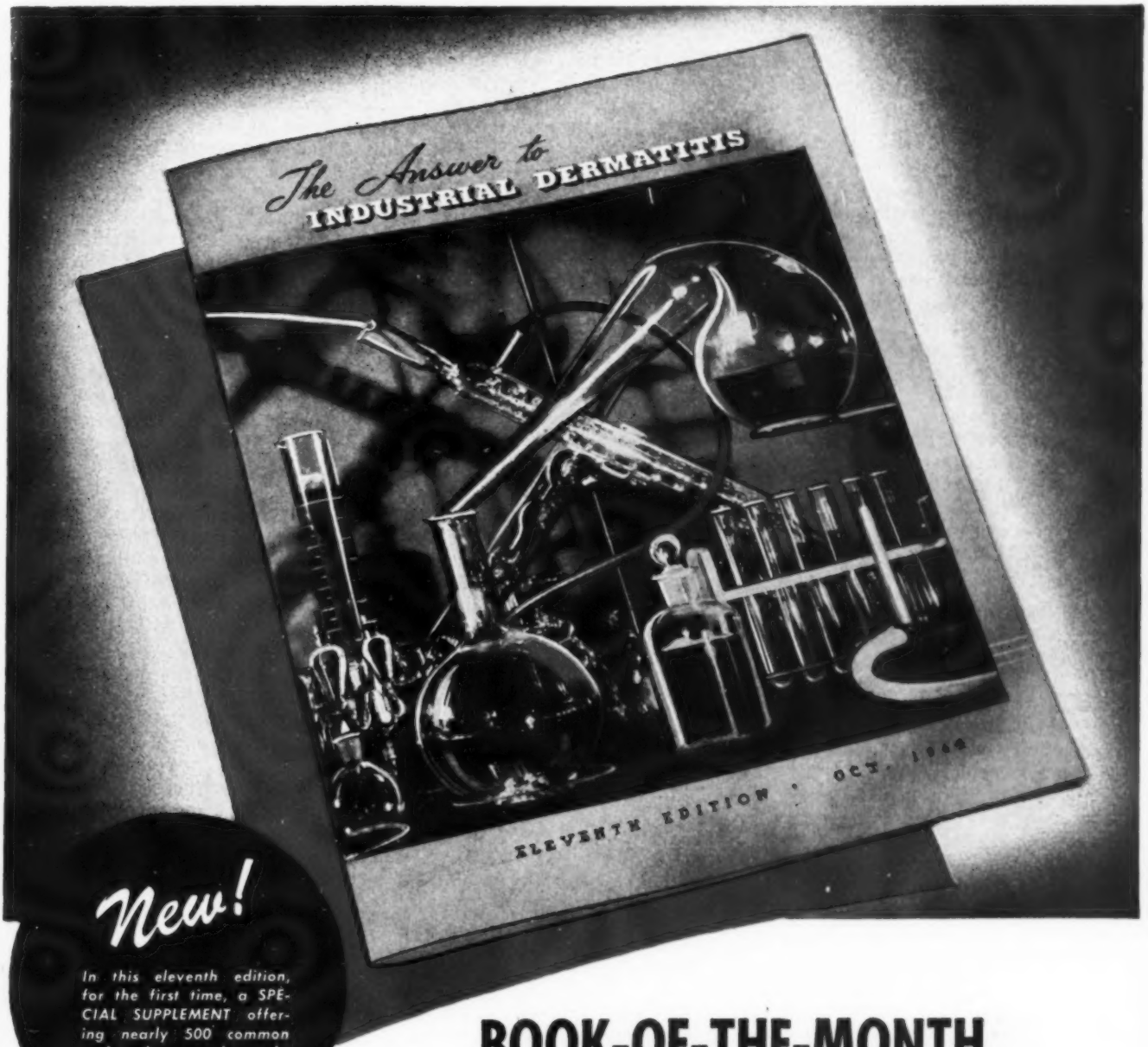

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Cooperation with family physicians for prompt and efficient management of non-occupational conditions, and rehabilitation measures.

Efficient records of all absences from sickness or injury causes, these records to be used as a guide in establishing preventive medical methods.

Appropriate salaries for the industrial medical staff.

MILLIONS of lives, dollars and man-hours have been, and can be, saved by such a program. Labor, management and medicine can have full confidence in this service, and can continue to reap the rewards which it brings in war and in peace.

Perhaps not every plant can have all of this program. But there is no plant, however small, that cannot have enough of it to keep the employees from unnecessary injuries and illnesses, and maintain the best standards of health among them. The physician is now a recognized and important factor in every employment situation. In industry, the physician is neither management nor worker, but instead the professional guardian of the health of the employees, without giving up his professional integrity to either the employees or the management.

Integration of Industrial Hygiene

—In the Public Health Program—

J. J. BLOOMFIELD,
Senior Sanitary Engineer,
U. S. Public Health Service

THE WORD "integration," which means "the uniting or becoming united so as to form a complete or perfect whole," has special significance in a discussion of public health objectives, because some health programs have developed as separate services, with some unavoidable duplication of effort. In public health we aim to use all the avenues by which people can be reached. We establish programs which help families as units, stimulate others which are directed toward school children, provide services for people in particular situations such as industrial workers, and set up programs on special disease problems. As these services multiply, the need for integrating all public health activities becomes apparent.

Before we can appreciate the possibilities of coordinating various activities, we should know the components of each of the services which have a relation one to another. If we attempt integration prematurely, efforts to combine forces may prove futile. The only way we can gain the cooperation of others in extending the benefits of a program, is by soliciting our colleagues' sympathetic understanding. I shall discuss the relation of industrial hygiene to other health programs and indicate some opportunities for integration in fields where little coordination has been attempted.

Industrial hygiene has been generally considered a specialized, technical field concerned with problems of occupational diseases and their prevention. In recent years, public health and medicine have realized that health programs in industry should be extended to provide all essential preventive services for the benefit of employees. This development has naturally led to closer cooperation between the medical departments in industry and community health agencies, as their aims have converged. This expansion of industrial health programs into the broader field of adult health has been encouraged by the Federal and state industrial hygiene services. At the same time, other branches of the official health agencies have recognized that their programs would be more effective if carried to the industrial worker through the resources of industrial health services and industry.

The question of how best to approach industry with our offerings of health services arises frequently. Obviously there should be a plan for minimizing the time and the difficulties involved in explaining the availability of public health services to busy industrialists. It seems that the best solution is to have the staff of industrial hygiene divisions make the essential presentation of a new proposal because the industrial hygienist has already become acquainted with managements and with the individual plant's program. Once an introduction has been made, the representative of the health department division concerned can then make such arrangements for launching the program as may be expedient. In suggesting this procedure as a policy, I do not mean to imply that industrial hygiene personnel are better qualified than other health workers, but rather to emphasize that considerable understanding of the workings of industry is necessary for successful cooperation. This understanding cannot be gained by any other process than association with industrial leaders and their staffs, and a study of their problems. Industrial hygienists become familiar with the attitudes and the interests of the people with whom they deal and are able to judge when and where a proposal will fall on fertile soil, or when and where failure may be expected. By taking advantage of this knowledge other health workers are spared time and needless disappointments, and can plan their strategy on a sound basis. In short, the industrial hygienist's experience qualifies him to determine the feasibility of introducing a special health program in a plant, and to adjust the all-important factor of timing.

At the same time industrial hygiene workers should keep themselves informed on developments in public health, because the over-all field is new to many of them just as industrial hygiene is new to many other health workers.

In order to cooperate with the industrial hygiene program, public health workers should be aware of the elements of a modern industrial health service.

First, is the provision of a safe and healthful working environment for workers. This involves study of actual and potential hazards to determine the danger from poisonous dusts, gases and fumes. Processes and materials may have to be changed to safeguard workers, or special equipment provided. Sanitation in the plant is equally necessary.

Second, an industry should provide medical and nursing services and a properly equipped dispensary. First aid treatment of illnesses and accidents was

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the original function of industrial medical departments —a service made necessary by state workmen's compensation laws. These services in the larger industries now have been expanded to include pre-placement examinations for applicants. The importance of these examinations is increasing, because the placement of large numbers of handicapped persons requires that the worker be carefully fitted to his job. The medical departments in large industries have further broadened their scope to provide a continuous preventive program, including periodic health examinations, which vary in frequency and type according to the requirements of the job. In small plants where a full-time medical service is not feasible, part-time services may be obtained from private practitioners of medicine and an industrial nurse may be employed full time. To supplement the medical service, large industries are also employing dentists to give emergency treatment and regular dental examinations. In the majority of industrial medical services, patients are referred to private physicians and dentists for definitive treatment, when the illness is not related to the job.

A health education program organized cooperatively by the medical and personnel departments is another feature of a complete plant program.

A third element of the program is the provision of feeding facilities for workers on all shifts, assuring them of adequate, inexpensive meals. A fourth essential may be called welfare services, including the establishment of mutual benefit plans, Blue Cross hospital insurance schemes, or other methods for the purchase of medical service by workers and their families. Counselling services to help individuals solve their personal problems, organization for recreation, and other activities that contribute to morale and healthful living, may be included.

Small industries are obviously unable to provide all these services and are therefore dependent on community health agencies.

The state health department, either directly or through local health units, is equipped to help industries in establishing most of these essential health services. In Kansas, the State Division of Industrial Hygiene has a physician, an engineer, and a chemist engaged in assisting the industries of this State, many of which are new plants producing war material. The staff has made surveys of aircraft plants, ordnance establishments, aluminum foundries, and metal mines. Among the hazards studied are exposures to lead, chromium, carbon tetrachloride, cyanides, cadmium, silica, fluorides, and welding hazards. The engineer, for example, checks the processes of production and the safety equipment designed to protect workers from fumes or dust. The chemist makes laboratory tests to determine the presence and amount of poisonous substances. In certain investigations, the physician examines the workers to determine if an occupational disease exists. He may act as consultant to a plant medical service in diagnosing occupational diseases. Requests for consultation with the state industrial hygiene physician may also come from private physicians.

When the industrial hygiene division completes a plant survey, recommendations for the control of hazards are made and discussed with management.

Recently a public health nurse has been added to the state industrial hygiene service to assist industrial nurses and to encourage the employment of additional nurses in industry—either full time or part time, as needed.

These functions of the state industrial hygiene division are specifically designed to reduce industrial disability resulting from conditions of employment. But the major share of industrial disability is due to common ailments which do not originate from employment. Combined data from many industries reporting to the Public Health Service show that loss of time on the job is primarily from illnesses such as respiratory infections, digestive disorders, and certain chronic diseases. These diseases together cause nearly 15 times as much lost time as the total absences due to accidents and occupational diseases. These problems must be attacked both in the factory and in the community, for it is only by continuous and concentrated effort of all public health workers, the medical profession, and industry that we shall appreciably reduce the waste of life, money and labor.

The tuberculosis control program offers an excellent example of the type of cooperation which can be undertaken by the state industrial hygiene service, and the tuberculosis control officer. In many states the chest x-raying of industrial workers has been arranged and conducted by a number of collaborating agencies including the state health department, the U. S. Public Health Service, the tuberculosis associations, local health departments and sanatoria, industries, and labor unions.

The industrial feeding program energetically promoted by the War Food Administration likewise presents convincing evidence that Federal, state, and local agencies, private groups, and industries can together plan and support a program that serves millions of industrial workers, and thereby helps to improve the health of the nation. Coupled with the in-plant feeding programs is an intensive effort to improve nutrition in the community. Renewed emphasis on restaurant sanitation and instruction of food handlers by health department personnel is helping to control outbreaks of food poisoning in many communities.

We do not know how much time is lost in industry from venereal diseases, but the Public Health Service considers the problem to be of such magnitude that special attention should be given to it by industry. A statement of "Recommendations to State and Local Health Departments for a Venereal Disease Control Program in Industry," prepared by the advisory committee to the U. S. Public Health Service, points out that the responsibility for the administration of the program should be shared by the industrial hygiene and venereal disease divisions of the state health department.

State dental health divisions are beginning to cooperate with divisions of industrial hygiene. The plan is to encourage industries to establish dental programs. State and local dental societies are also giving assistance to the solution of the acute needs of industrial workers for dental care, by determining the number of private dentists willing to adjust their hours to permit serving workers.

The state medical societies and a number of county medical societies have followed the advice of the Council on Industrial Health of the American Medical Association in organizing committees on industrial health for the purpose of promoting a better understanding of current industrial hygiene problems among all physicians, and to enlist their interest in giving part-time service to small industries. Physicians are also being encouraged to report cases of occupational disease.

Kansas has no state compensation law covering occupational diseases and none requiring the reporting of all occupational diseases. The present regulation, covering a few specific types of industrial poisoning,

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might well be changed to require reporting of all occupational diseases. The active cooperation of the medical profession with the state health department could then be developed for the purpose of securing complete reporting.

Many of industry's problems are due to the lack of a mental health program—either in industry or in the community. Accidents, absenteeism, labor troubles, job quitting are often symptoms of maladjustment, which could be detected by trained psychiatrists working in the plant, or serving industry through outside clinics. State divisions of mental health or mental hygiene associations could offer their services to industry. Tests which could be used in the initial examinations of workers to determine their intelligence, stability, or other personality traits, might be suggested. Advice could be given on how to maintain morale and prevent friction in groups constantly associated at work, and procedures for handling personality difficulties could be outlined. This field is of major importance at the present time, because of the increasing stress of wartime life. It is probable that the attention being given to returning service men will awaken management and community leaders to the need for better understanding of mental health problems and for action aimed toward minimizing their causes.

A primary need in all states is for better integration of health programs and educational programs in schools. Industrial hygiene should be introduced in health courses, especially at the high school and college level. Vocational schools and agencies especially should provide some instruction in industrial hygiene. Instruction in general courses need not cover the technical material intended for specialists in the field. The general background of industrial development, industrial and labor relations, the common problems of personal hygiene and sanitation associated with work could be briefly presented to high school and college students.

Professional education should give more consideration to the industrial hygiene field, particularly in schools of medicine, engineering, nursing, and dentistry. Short courses should be arranged for in-service training of professional personnel already employed in industrial hygiene and allied fields. Many courses of this type are now being given and they will continue to be needed for a long time because there is every reason to believe that the present expansion of industrial hygiene will be sustained after the war.

At this point, let us consider the people for whom all of this effort in education, planning, and coordination is being made—the workers. We must recognize that any program to be successful is dependent on the workers' willingness to cooperate. Health specialists should assume the leadership in proposing new health services. Management or workers' representatives, or both combined may request public health agencies to make plant surveys, to give chest x-ray examinations, or to help set up an in-plant feeding program. It is good policy for management to include workers' representatives in planning for health programs, since the workers themselves must understand the value of the services in order to gain benefit. In some instances labor and management may share the financial cost of the program. Workers in industry are the same people on the job as in their homes—they like to be treated as thinking people. Educational activities, preceding or accompanying any new program, give all the workers a chance to share in its actual promotion, since each worker is then convinced of its value and is likely to spread the news among his fellows. Where labor unions are well organized, the union will naturally be the channel through which the workers express their interest and receive information.

The unions are showing increasing interest in health matters, and in a few states have held conferences at which problems of health legislation and medical care have been discussed and resolutions recommending action have been adopted. Public health workers should be aware of their responsibility for informing union leaders on existing health programs and the need for additional appropriations or new regulations or legislation.

At the same time there is an equal responsibility to keep organizations representing industrialists informed on health matters, including manufacturers and trade associations, chambers of commerce, and business men's clubs. In Kansas, these organizations have not yet been sold on the industrial hygiene program, despite the importance of the work to their enterprises.

In this review of the interchange of effort between industrial hygienists and their colleagues, it seems clear that teamwork is becoming a reality in the conduct of public health services. The war has accelerated this progress because of the tremendous need to maintain industrial production and because of the widespread feeling that we must pull together to win the war.

CURRENT ARTICLES of QUALITY

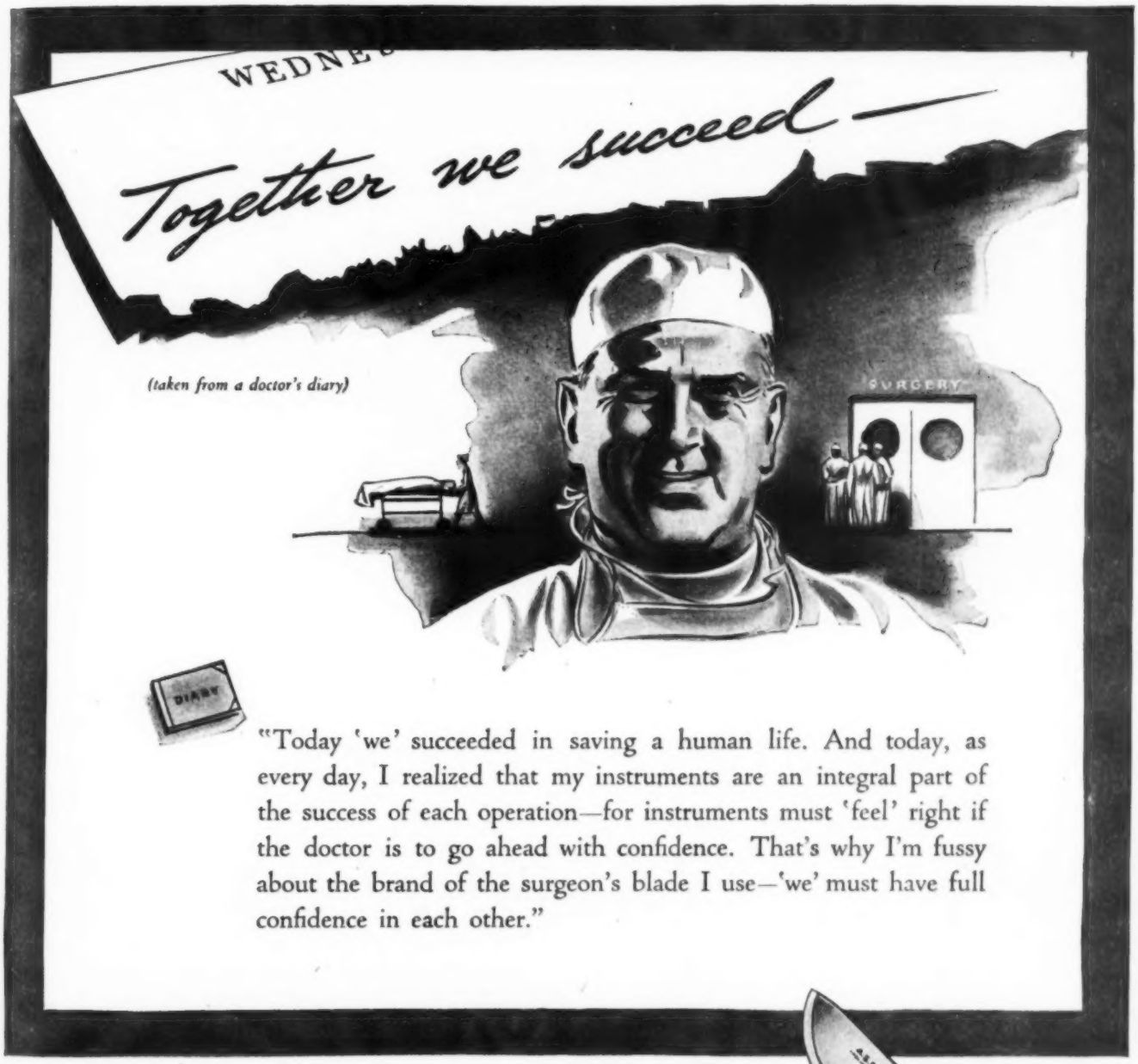
—*Continued from page 54.*

fact that a large number of x-ray examinations will be required in certain industries. In some instances pre-employment x-ray examinations are indicated for every worker, to be followed by periodic examinations during future employment. A subcommittee appointed to investigate the matter of fees to be charged for these x-rays made the following recommendation: If the number of x-rays required in any given plant or industry is large, a fee of not more than $5.00 should be charged for each x-ray. In accordance with the report of this subcommittee and because higher fees have led, in other states, to the practice of installing plant x-ray equipment and sending films elsewhere for interpretation, the Committee unanimously voted to recommend that the House of Delegates at this session adopt a maximum fee of $5.00 for mass x-ray examinations made under the Occupational Disease law of the state.

—A. E. WILCOX, M.D., Chairman.

Psychiatric Casualties

WINFRED OVERHOLSER, M.D., "Psychiatric Casualties of War and Their Treatment," in *New England J. Med.*, September 14, 1944 (231: 11, 377-380). Conclusion: "What of the future? One of the greatest defects of public education at the moment is shown in the lack of the proper attitude toward the psychiatric dischargee and rejectee. The attitude of the family, the attitude of the employer and the attitude of society as a whole leave much to be desired. Too many persons fear the man who is known to have suffered a psychiatric disability in service. They fear that he is a 'raving maniac,' that he is unsafe to have about, that he is so changed a person that he should be looked on as a pariah. There are employers who refuse to re-employ a man known to have been discharged for a psychiatric cause. Such a situation is tragic and must be rectified if the improvement of these men is to be maintained. If the dischargee comes home to find himself rejected, he loses confidence and may readily suffer a relapse. One may question also what the effect of the generous



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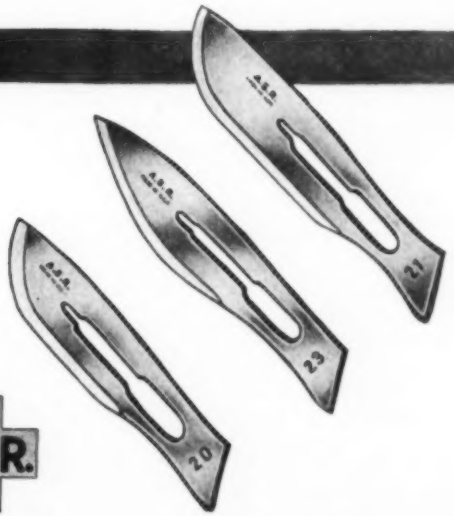

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compensation laws enacted by Congress is to be. It may well be that cases will be kept active because recovery is to be penalized by loss of a fixed income. In this regard war casualties of a psychiatric nature are likely to be similar to unsettled industrial-compensation cases. If lump-sum settlements could be arranged, it is likely that greater inducement would result for the recovery of the patient. Finally and most important, if these men on returning can be made to feel that they are respected, that they are wanted, that their place in the community is secure and that work is available for them, we may safely dismiss any fears that we are to be overwhelmed by a flood of permanent psychiatric casualties of war."

Disability Paradox

LEOPOLD BRAHDY, M.D., New York, "The Paradox of Vocational Disability," in *Diseases of the Chest*, September-October, 1944 (10:5, 442-446). Text: "Insurance benefits or sick-pay during periods of vocational disability are becoming quite common. In tuberculosis it is not easy to decide at what time a patient should resume some gainful occupation and, later, at what time he is able to resume his regular work. After having made the decision, the physician is faced with the more difficult task of submitting a report, giving the reasons for his conclusions in language that the layman can understand. The physician cannot escape this duty. He should welcome it because these reports bring the opportunity to educate employers, insurance carriers and civic authorities on the role of rehabilitation in tuberculosis. It is only too true that 'official agencies have consistently underestimated the significance of rehabilitation.' Perhaps this is in part because physicians have not explained its significance in specific individual cases. In order to get all agencies to take a sounder view, we must take advantage of opportunities in individual cases to reiterate the role of rehabilitation in prevention and treatment instead of merely proclaiming general principles and then expect laymen to apply them. Before teaching others, the physician himself must study the relationship of the disease to the patient and to his earning capacity. This is a complicated problem involving personal, social and economic factors but it is essentially a *medical* problem—a problem in functional diagnosis and therapy. The physician must think it through until he can express his reasons convincingly. Recently, an ex-patient was referred to me because of disagreement between two physicians. One reported: This man has arrested tuberculosis; he is able to resume some work. The second physician agreed that the disease was arrested, but concluded that he was totally disabled from any gainful occupation. The reports of both physicians evidenced a desire to be accurate, but failed to take into account what 'able to work' meant to that ex-patient. Their reasoning on the relationship of rehabilitation to disability was muddled. My own conclusion seemed to increase the confusion until my reasons were given consideration and then they were accepted. My conclusions were: 'This man is able to do some light work or else to resume his usual work for short hours; however, he is totally disabled at present.' This is the paradox of vocational disability. It is hoped that the exposition of the paradox in this case will clarify the principles of rehabilitation in tuberculosis and will aid the physician in proper certification of disability in tuberculosis. *Case Report*: J. H. N., former hospital helper. Referred for decision as to whether he is totally disabled or partially disabled, or able to resume his occupation.

This man had six years of elementary schooling. After leaving school, he did various odd jobs until he was 18, when he was hired as a hospital helper. At the hospital he had been a steady and satisfactory worker for five years when it was discovered that he had active tuberculosis acquired in the course of his occupation. He was then 23 years old. He was admitted to a sanitorium. Complete bed rest was prescribed during the first months of his illness and later, when permitted to get out of bed, he was taught to do things slowly, to use a minimum of physical effort, to abstain from mental exertion and to avoid emotional reactions. As his condition improved, ordinary activity was permitted. Toward the end of his first year he worked in the sanatorium carpenter shop for an hour a day. He enjoyed doing this for the next four months, and then he was discharged from the sanatorium. After that he stayed at home, went out for a daily walk, but did no further work. I saw him one year ago. X-rays and clinical investigation had shown that for some months his disease had been arrested. Under the mild activities of his daily routine he felt well. He desired to do some useful work, but was uncertain as to whether he was able or should even try to resume his regular duties as a hospital helper. 'My kind of work was never easy and I know it is tougher now because of the shortage of help.' He had applied for part-time work elsewhere but, he added: 'They don't want me when I tell them I've had no job for four years on account of tuberculosis.' At that time I told him either to get a part-time job or to undergo some training for a trade. He began a course in free-hand drawing at a commercial art school. He has been going to this school for two hours a day, and hopes to qualify as an assistant to a comic strip artist, but he is vague as to this prospective occupation. He brought some of his school sketches; they showed some ability in copying, but no special talent. As required by the Compensation Law for Occupational Diseases, he is receiving $14.25 a week from the hospital in which he had been employed as long as he is totally disabled. All necessary treatment must be provided. Those payments are discontinued when he has recovered his previous earning capacity. A machine may stand idle for years and, if it it has been kept clean and oiled, it can be set going again at a moment's notice. But a man on enforced rest for the same period undergoes profound physical, mental and emotional changes which, even though the disease is arrested, make him incapable of doing any useful work. These changes in a man are reversible; his capacity for physical exertion can be recovered; his psychic and emotional stability can be restored. The normal desire to earn his own living will then assert itself and, with proper encouragement, will become dominant. To guide him toward this goal requires knowledge of how and when and what to do. This is vocational rehabilitation. Vocational rehabilitation can be achieved only if it is under direct medical control and is supervised by persons acquainted with the technique of rehabilitation. Rehabilitation is treatment. It is a part of the treatment as necessary for a tuberculosis patient as prescribed rest, diet or pneumothorax. This man should be given vocational rehabilitation as part of the treatment of his disease. His treatment is incomplete until he has been rehabilitated. Rehabilitation of tuberculosis patients is provided in many institutions and some, such as the Potts Institute and the Altro Work Shop, have this as their main purpose. In these specialized rehabilitation institutions results are excellent, but all patients are not suitable for admission to them. More such institutions are needed but it is no longer necessary or desirable that all patients receive rehabilitation by going there. Their methods have been formulated and published; they can now be applied by others. The staffs at these institutions have accomplished more; they have taught the medical profession that their institutional results can be improved by rehabilitating employees *within industry*. This means specialized rehabilitation institutions are not essential for those ex-patients who had definite occupations which they can resume in graded stages. For these ex-employees the best results are obtained when rehabilitation is done *in the same plant or office, at the same occupation in which they formerly worked.* In business and general industry that is not easy because the supervising personnel never had contact with sick or handicapped workers. The background of the supervisors may not be such that they can be taught rehabilitation principles very easily. In spite of this, the system of rehabilitation by assigning selected tasks within industry with shorter hours and longer rest periods is functioning well. In one field of employment conditions for rehabilitation are ideal

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—that field is in hospitals. The supervising personnel in a hospital is better informed on medical problems —they have a more sympathetic attitude toward their handicapped employees and they can quickly learn the methods of rehabilitation. In a hospital, medical supervision is more readily available. The variety of jobs in a hospital requires all grades of skill, intelligence and exertion. All this makes the task of rehabilitation, when undertaken by hospitals, less difficult than in any other industry.

In the case of J. H. N., cited above, his former employer is a large hospital with many jobs to be done. The hospital is now short of trained personnel. Here is a man with five years' experience in a job. Hospitals are now forced to train men in a few weeks for those jobs and put up with their lack of skill. Rehabilitation of an experienced man is part of the national war effort. At present this man cannot tackle a full-time job. But with medical supervision of his assignments, he could now do much useful work and later could be guided back to full service. If he is not started on a light assignment, he can do no work at all. He will be useless to himself and to everyone else. He will continue to be an expense to the former employer, who must continue to pay his compensation. He and his family must continue to live on his meager compensation payments instead of on his normal earnings. We know that expatients who have been rehabilitated are less likely to have a recurrence than those who drift along in idleness. No new employer is likely to give him a supervised light job, except as a matter of philanthropy. As a matter of enlightened self-interest, the former employer who must pay his compensation should provide such a job. *Conclusion*: This man, now 28 years old, has a partial disability, and is able to work short hours under medical control. He should be assigned three hours' work every morning, six days a week for three months, after which his assignments probably can be steadily increased. This should be begun now, and until it is begun he is totally disabled. *Summary*: It is part of medical diagnosis when physicians decide a patient has recovered sufficiently to do light work or to do his regular work on part-time. Disability certification at this stage of tuberculosis is well formulated in the paradox 'From a vocational viewpoint, totally disabled at the present time but capable of doing selected work.' Such certification gives the physician the opportunity to explain the role of rehabilitation to employers, insurance carriers and civic authorities who require disability certificates in order to administer sick-pay and insurance benefits. Employers and administrators have not been sufficiently informed on this important factor for recovery. Physicians must use each case to reiterate that rehabilitation is part of treatment. If a job is made available in which the work, hours and the patient are under medical control, then the patient is able to do useful work and will probably progress rapidly toward completely restored working capacity. If such a job is not provided, he cannot do any work, continues totally disabled and progresses toward completely restored working capacity at a snail's pace. The author cites the case of a hospital worker to illustrate these principles. Rehabilitation through medically controlled wage-earning work is most successful when done by the employer for whom the patient worked prior to his illness. The employers who have the best facilities and opportunities for rehabilitating their former employees are our hospitals. Special institutions for rehabilitation are valuable especially because they have taught us that the major part of rehabilitation must be accomplished within industry."

Salt and Sinusitis

FRANK GRAHAM MURPHY, M.D., Mason City, Iowa, "Salt a Cause of Deafness and Sinusitis," supplementary comments on the article so entitled, in *Clinical Medicine*, August, 1944 (51:8, 207-208): *"Salt to Prevent Heat Exhaustion*: For men who engage in physical labor and are exposed to dry hot conditions and who sweat freely a moderate daily intake of salt should be about three level teaspoonfuls to maintain a normal salt balance. With considerable physical activity in dry hot surroundings a greater intake than three teaspoonfuls daily is not helpful. Though a much lesser quantity may not prevent heat exhaustion in dry hot surroundings. *Less Salt To Prevent Sinus Trouble and Deafness*: They who suffer from sinusitis or deafness including those who are just beginning to notice that they are slightly hard of hearing which is not from ear wax or other obvious causes and who work or live where the temperature is moderate or even in the temperature of the average home should not add salt to their food at the dining table. Invariably there is sufficient salt in the cooking, although the quantity varies considerably in different families. Therefore the amount to be used is a problem to be worked out in each individual household whenever one or more persons in the home do not hear as well as they formerly did or notice evidence of sinus trouble. In these ways some persons are unfavorably affected by salt more readily than others. Because most of us know persons who ingest salt freely at all times of the year with no apparent ill effect must not blind us to the fact that the sodium and water balance is easily disturbed in a large percentage of our population when even a small amount of salt is consumed. As older persons do not so readily eliminate sodium chloride deafness is more likely to be experienced by the aged. *Low Blood Pressure and Sodium Chloride*: They who have low blood pressure and are suffering from deafness or sinus trouble from an over consumption of salt often maintain that they feel better in other ways when they consume salt quite freely. Salt to them is a heart tonic. They invariably eat more sugar and starches than they should and may be slightly over weight. For these persons sugar and starches when eaten plentifully may also function as fluid retention ingredients and should be substituted for a low carbohydrate diet as the potato, the ripe banana and other fruits and vegetables. 'One medium sized baked potato is no more fattening than a big juicy apple or a large orange'—*Science News Letter*. Should weight be somewhat reduced in this way they with low blood pressure may more easily find their sodium chloride tolerance if at the same time they avoid taking soda in any other form or if bicarbonate of soda is not used in the preparation of foods. This would permit less reduction of sodium chloride without perceptibly reducing their chlorine intake, thereby maintaining a more adequate cardiovascular function and a sodium consumption sufficiently low to establish a more nearly physiological sodium and water balance in the ears and sinuses. In edema fluid the ratio of sodium chloride to sodium bicarbonate is about five to one."

The Industrial Back

MORRIS AXFORD, "The Industrial Back, with Some Observations on the Compensation Aspect," in *New Zealand Med. J.*, Supplementary Issue, Auckland Post-graduate Conference, April, 1943. Extract: "And now to get back to the strained back. Let me describe two case histories, both of which must be familiar to all of you. *Case* 1.—A middle-aged business man, Mr. A., consults Dr. Smith. He says that, when assisting a friend to lift a heavy log, he had just taken the weight when his friend let go. He felt a sudden stab of pain in his back and perhaps also felt or heard something snap. His back is now stiff and painful. Dr. Smith finds an acutely tender area in one erector spinae muscle, and maybe in the mid-line at the lumbosacral junction. The muscle is in spasm and the patient cannot bend or straighten up without pain. A torn muscle is diagnosed. Mr. A. is advised to go home, take a hot bath, and then go to bed and rest. Later that night he rings the doctor to say his back is so painful he cannot sleep. A quarter of morphia is given and he has a comfortable night. Next day his back is stiff and sore. He remains in bed for two or three days, with a hot bottle to his back, and a sedative to take at night. In a few days he is much easier, and is told to get up and take some gentle exercise. In a week he is comfortable enough to go to the office. In a fortnight the only thing that still hurts is a full bend or a heavy lift, and in three or four weeks he is completely recovered and

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Dr. Smith hears nothing more from him. *Case* 2.—A middle-aged miner, Mr. B., consults Dr. Smith, stating that he has injured his back assisting a mate to lift a skip back on to the line. The account of the accident, his symptoms and the result of Dr. Smith's examination tally almost exactly with the case of Mr. A. Dr. Smith gives him a prescription for a methyl salicylate liniment and a certificate of unfitness for work for seven to 10 days. After 10 days Mr. B. is no better. His certificate is repeated on two or three occasions but he does not improve. After a month or so he says 'It ought to be right by now, what about trying work next week?' B says he will 'give it a go' but returns later saying he could not bend or swing a pick and will have to go on 'compo' again. Dr. Smith gives him a sample tin of iodex to rub on his back. After several more weeks B is looking really worried, is not sleeping well and is beginning to get tremulous. Dr. Smith examines his back again and to his surprise finds it very stiff, tender and apparently painful on every movement. He sends his patient to the insurance company's doctor. The appointment is made for two weeks later. B is examined, x-rayed and sent home again. Three weeks later he learns that the specialist has recommended massage treatment. This he cannot get because there is no masseur in his town. The case drags on. Later other specialists are consulted. After months of delay he is taken into hospital, where his back is massaged, manipulated, exercised, injected, and may be put in a plaster jacket or a spinal brace. By this time B cannot cooperate, has lost hope and is bewildered. He then interviews more doctors and solicitors and after 18 months his case is heard in the Compensation Court. Three doctors state that he has a permanently disabled back and will never work in the mine again. Three equally confident doctors state there is nothing wrong with his back but he is suffering from neurasthenia. A somewhat undignified argument is aired, the Court awards him £200 and the following week he buys a motor car, returns to the mine and gets his old job back. Dr. Smith is bewildered. He had two injuries which seemed to him the same and yet turned out so differently. What is the explanation? And is there any way of preventing cases like B's? I think there is an explanation but it is not a simple one. And there are remedies but they are not simple either. It is not purely a medical problem. Other factors, not medical, which have a bearing on many industrial injuries are social, racial, financial, political and domestic. Let us consider for a moment the case of Mr. A. He is an intelligent, well-educated man. He obtained immediate efficient attention and was quickly relieved of his pain. He got a simple explanation of what had happened and an assurance that it was not serious. He accepted this explanation and understood it. He was not financially embarrassed by his enforced rest and had nothing to gain by prolonging his disability. He was not frightened to exercise his back muscles even though it hurt a bit at first, because he knew he would not harm himself. As a result he found his back improving slowly, he did not have to do any heavy lifting for a while and he recovered completely without any anxiety. In other words, his physical injury reacted normally, received normal treatment, and recovered normally without complications. There were no non-medical factors to interfere with his recovery. Now take the case of B. He is probably an honest hard-working man, not particularly intelligent and almost certainly uneducated. Working as he does in a mine he has probably seen one or more of his mates suffer a fracture dislocation of the spine with paraplegia, and remain paralyzed for life or die of his injury. He feels something break in his back, is immediately disabled and in pain. He does not receive a satisfactory explanation of what has happened and possibly could not understand it if he had. Later he becomes suspicious and does not believe it anyway. He does not receive very efficient treatment and is not relieved of his pain immediately. He remains at home with nothing to do, inactive and in pain. His home is probably a humble one, with no comforts, he has a large young family, and he is in the way. After a few weeks he is still in pain, his back is stiff and it is not improving. There is no one to reassure him. He has nothing to do and begins to brood. He wonders how he will carry on if his back does not recover. He becomes anxious and irritable. His relatives and friends advise him to rest more and not to work if he still feels any pain. After one or two attempts to work he loses confidence in his doctor. Visits to specialists and radiologists are made with suspicion. He thinks he is an unusual case, that the doctors either do not know what is the matter with him, or cannot cure him. Sometimes treatment recommended is unprocurable or too expensive. By the time he gets it, it is often too late. He fears that if he signs off insurance and returns to work his back may give out and he will lose his claim. Gradually he becomes a real neurasthenic and the case is hopeless. No massage, no exercises, no manipulation, no brace or plaster jacket, no arthrodesis, nothing in the way of physical treatment will cure this man. He has plenty of pain and it is now unrelieved by rest. His back now is either completely normal on examination or so stiff and immovable as to be beyond belief. It is wrong, in my opinion, to label such a case fibrositis or rheumatism, but it is not uncommon to find it so diagnosed. If physical treatment will not cure this man, what will? My answer is money. Some will say that such an idea is a capitalist myth. But the fact remains that a sum of money accompanied by a final settlement of the claim in the vast majority of cases results in the man returning to work in a very short time completely cured. It is no good hiding our eyes to this. I have observed it in dozens of cases during the past 10 or 12 years, and a successful result of a cash settlement in such cases is monotonous in its regularity. How can such a state of affairs be prevented? It is not always possible for the doctor to prevent it. As I have shown, many non-medical factors contribute to the tragedy. I think, however, that many cases could be prevented and I propose to spend a few minutes indicating what appear to me some measures which would result in improved results. *First of all the importance of the initial medical treatment.* How often it is that a case is referred to us after months of treatment and continued disability when the initial injury appears to have been simple if not trivial. Close inquiry often reveals that the initial treatment was faulty, and the prolonged disability has resulted from physical processes which could have been prevented by correct and simple treatment. Once a case is mishandled it is astonishing to see sometimes how a simple disability develops into a serious and complicated one. I will now outline what I think is the correct management of the acute strained back. A thorough examination of the patient's back, on the lines demonstrated here, followed by a short explanation of the diagnosis, the line of treatment to be followed and an estimate of the probable symptoms and their duration makes a good start. I think all these backs should be first rested and pain should be relieved. A few days in bed, with strapping, or warm comforting applications, accompanied by a daily and nightly sedative, morphia in severe cases, is important, as this prevents big effusions of blood or serum into the damaged parts. An early start of active exercises, with a demonstration of how to exercise the back muscles and encouragement to continue in spite of discomfort, aids recovery by preventing organization of exudates into adhesion formation. For cases which are severe, or those which do not progress quickly, I am a firm advocate of massage and physiotherapy. If a strained back is not recovering in two weeks it should be sent there and then to a good masseur or masseuse. Radiant heat or infra-red light followed by vigorous massage, and it must be vigorous, accompanied by instruction, demonstration and practice of active back muscle exercises, works wonders at this stage. Apart from the actual physical benefit, the psychological aspect here is important. The man feels something is being done for him and he has a confidant he can talk to. Few muscles or fascial injuries will not respond quickly and recover with such treatment. *Payment for Workers' Compensation Cases.*—Why is it that many strained back cases do not

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receive this or a similar routine of treatment? Perhaps occasionally through lack of knowledge. But more often, in my opinion, through indifference. This indifference develops gradually in practitioners because they feel they are insufficiently rewarded. In this country the Workers' Compensation Act allows the doctor £1 as remuneration for treating an injured workman. For a minor cut requiring a stitch this may be adequate, but it is not for many injuries and certainly not for many injured backs. The sooner the medical fee for such cases is raised by Act of Parliament the more encouragement there will be to the doctor to spend more time, trouble and interest in the so-called Compensation Case. This brings me to *the attitude of the employer.* The employer could help in two ways. Firstly, by assisting the injured worker to get treatment, but this is rarely done. In one large mining district in the North Island the employers of the mine, through the insurance company, pay a full-time fully trained nurse to run a dressing-station where she attends to all minor injuries, and also half the salary (shared with the Hospital Board) of a full-time trained masseuse. The result in this area has been a great decrease in troublesome back cases and is in marked contrast to the large number of unsatisfactory cases in other mining districts where no such facilities are provided. Secondly, the employer can assist by finding light jobs for the men to do on returning to work after back injuries, allowing them to work shorter hours at first and generally adopting a helpful and sympathetic attitude. Although there are exceptions, this in my experience is not often done. Finally, *there is the attitude of the man's union.* In my experience the man's union does little or nothing to help him when he is injured. Union secretaries often prevent a man returning to light work on medical advice and so actually hinder his recovery. Unions have a great influence and we know fight tooth and nail to get men better wages, shorter hours, and sometimes better conditions of work. If they wanted to they could do much to help in the rehabilitation of the injured man, by helping him to get early and efficient treatment, encouraging him to return to work and obtaining for him at first suitable light work and easy conditions until he has 'broken himself in.'

The Chronic Back.—I have only a few words to say about the chronic back strain. It is clear that, in spite of all efforts on our parts, many cases become chronic. Exudates in torn muscles, fasciae, and ligaments become organized into painful adhesions, muscles atrophy and become weak and joints stiffen. It is now a chronic lumbar, lumbo-sacral or sacro-iliac strain as the case may be. In such cases I think the best thing to do is for the general practitioner to refer him to an orthopaedic specialist. He may order concentrated massage and active exercises or he may manipulate the back under an anaesthetic first to break down adhesions. Large numbers of cases respond to this treatment. Unless some abnormal radiographic feature is found I am against the use of plaster jackets or spinal braces, or arthrodesing operations in these cases. The use of a spinal brace is often fatal. It magnifies the injury in the man's mind and it is usually harder to get him to leave it off than it was to get him to put it on. I know that in many American clinics arthrodesing operations for chronic lumbo-sacral and sacro-iliac strain have been recommended and practiced for many years. Statistics of results published by American insurance companies show them to be far from satisfactory in compensation cases. Many other operations have been recommended and no doubt some give good results. Nevertheless, in my opinion, operative treatment for the chronic strained back cannot be necessary in many cases, and the multitude of ideas and theories regarding them makes one wonder whether all of them will eventually not be given up. On this subject I must confess I find myself at one with Howard L. Prince of New York, who in 1939 wrote: 'Having listened for many years to papers on low-back conditions and having read others, I find myself in the position so well expressed by Omar Khayyam, "Myself when young did eagerly frequent doctor and saint and heard great argument about it and about; but evermore came out by the same door as in I went."'"

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NEWS, COMMENT and OPINION

—*Continued from page 40.*

crackpot patient can cause the doctors no end of unpleasantness. More irritating is the limitation in the allowance for drugs. Only certain inexpensive items may be prescribed. When two doctors in London, unaware of this, ran a large-scale scientific experiment on their aged patients by giving them large doses of codliver-oil and malt-extract (the doctors acted in good faith and accumulated valuable data), they were fined 1000 pounds. This raised such a furor that the affair was investigated in Parliament. Regretfully Parliament had to agree with the verdict because it was within the purlieus of the law. Further, there is the limitation of what the doctor may do for his patient. The law says he may do only what is commonly considered to be within the province of the general practitioner. This definition has been tested repeatedly in court and has been very narrowly interpreted. For instance, a doctor may not inject hemorrhoids, give diathermy, remove polyps, or electro-coagulate warts. In fact, about the only thing he *can* do is to prescribe some inferior drug and he resorts to that abundantly. If the patient needs a consultant or an operation, he must be sent to the hospital. The practitioner than loses track of his patient altogether, but a few with special training may apply for staff privileges. In Kidderminster, out of a total of 13 physicians, there are only two who may operate. These are paid a small fee when they operate on a panel patient. An appendectomy nets them one pound. The average office-call for a panel patient lasts three minutes: one minute to usher the patient in and out, one minute for the questioning and examining, and one minute for the writing of the prescription and the records. Since the doctor also sees many "club patients," his average daily quota of patients is from 60 to 70, about three-quarters office work and one-quarter house calls. His day lasts from 9:00 in the morning till 8:00 in the evening. He takes one afternoon a week off, plus his Sunday, and a two- to three-weeks' vacation every year.

—From an article entitled "The Status of the English Doctor," by MAJOR CLIFFORD L. GRAVES, in *Bulletin of the Medical Society of the County of Kings*, September, 1944.

Industrial Medicine on Broadway

DR. VICTOR G. HEISER, pinch-hitting, as guest columnist, during Walter Winchell's vacation: "SO MUCH progress has been made in improving war workers' health, illness among all groups of people should be greatly reduced in postwar America. The Metropolitan Life Insurance Company reports that in the months April to June of this year, the death rate, based on statistics of its industrial policyholders, was

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the lowest for the like period of any year except 1941 and 1942, when all-time records were set. The mortality rate was 760 per 100,000 policyholders, 3½% below the corresponding rate of last year. . . . THIS is most encouraging, but we cannot drop our guard one moment. A health education program is more important than ever today because of the manpower shortage. The armed forces have taken most of the physically fit. Industry has assimilated millions of women, older men and physically handicapped persons and is doing a wonderful job not only in training them but in keeping them well. But we must remember that 121,000,000 man days were lost from war work in 1942 alone due to absences of workers for all causes. This is equivalent to the time required to build 5000 Flying Fortresses, not to mention about $1,000,000,000 lost in wages by workers. . . . THE NATIONAL Association of Manufacturers recently made a survey of 2064 plants. The factories checked represented 47 states and employed 1,945,551 workers. Those plants with health programs showed the following percentage reductions: Accident frequency, 44.9%; occupational disease, 62.8%; labor turnover, 27.3%; absenteeism, 29.7%; and compensation insurance premiums, 28.8%. . . . HERE are some more reasons why a health program pays. Physical examinations were instituted in a textile mill group. There was a 14% increase in production with the use of 6% fewer workers, who were given other employment fitting their physical conditions. A large mercantile establishment, averaging 4000 employees, installed medical supervision. Result: A reduction of loss of 8000 working days the first year. Third year showed saving of 16,000 working days as compared with the first year. A rubber footwear manufacturer discovered imperfect products leaving the plant. A checkup of eyesight of the inspection group showed 20% had defective vision. Corrective measures restored quality of goods to former level. A health program is credited with keeping 7600 persons working 77 to 84 hours a week in an acute manpower shortage area without ill effects. Company records show employees gained weight and enjoy good health. . . . THE INDUSTRIAL physician fights this battle of health with many tools. They include medical examinations, immunization, dental care, control of communicable and occupational diseases, health education, nutrition, mental hygiene, good sanitation, safety equipment, adequate heating, lighting and ventilation. . . . PREPLACEMENT examinations are given workers by most large companies. They are as important to the individual as to the company, the primary purpose being to determine what job will best suit his physical capabilities. Women and their special problems are receiving medical attention in the factories. Many firms have policies whereby pregnant women may stay on the job until their own physicians say they must stop. Then they must stop. And they receive leaves until after the child is born. . . . ONE of the greatest single problems confronting industry is proper feeding of the workers, for malnutrition is a great saboteur of America's assembly lines. The number of workers who suffer from this 'hidden hunger' may currently be as high as three out of every four. This manifests itself in absenteeism and in fatigue and, in many cases, in deplorable ineffectiveness on the job. Much has been done to educate the worker. Pamphlets, lectures, posters and nutrition courses aimed at improving lunch-box and home menus have helped. Cafeterias, lunchrooms, mobile kitchens and between-meal snacks are found in many plants. . . . A LARGE electrical goods manufacturing company cut accidents 30% by serving sacks of good basic foods between meals. At another plant where milk and fruit were served between meals, production increased 4%, errors decreased 8%. A milling company in Alabama reported a 10% production increase due to a nutrition program. Another company gave 1500 employees a free pint of milk during a five-minute recess. Result 30% decrease in accidents, increased production, absenteeism down. A large company in Ohio started a 'Health for Victory' club which provides a meal-planning guide for wives and mothers who prepare meals for workers off the job. The plan has spread to more than 200 factories in 25 states. . . . THE NATIONAL Association of Manufacturers has been conducting a campaign for more than seven years to show small industries hiring 500 persons or less the desirability of a medical service. This is of utmost importance, for such plants employ more than 50% of the nation's army of industrial war producers, now some 20 million strong. When this is accomplished industry will have taken a great step forward. . . . WINNING the war and a lasting peace is the paramount effort of the American people at the moment. Then we will turn to the great task of reconversion and building a postwar America, an America with jobs for all who want to work. But this will be possible only if we are a healthy nation. This is the great challenge to industry, for the workers and their families make up a large segment of the population of the United States."

Cancer and Single Injury

I AM interested to note your editorial of August 12 on the matter of claims for disability said to have resulted from cancer caused by a single injury. In my opinion this editorial is timely but scarcely goes far enough. Traumatic cancer attracted my interest for a rather brief period following the death of the late Dr. James Ewing. Dr. Ewing had been interested in this matter for years and at his death a number of unfinished cases were turned over to me for completion. In the course of hearings in these cases I acquired an exceedingly bad taste both for certain members of the legal profession and for members of the medical profession who seemed to me to be quite willing to testify to almost anything for a fee. I likewise learned to distrust the type of referee who is so afraid of possible injustice to a claimant that he tends to make awards in the face of incompetent evidence, and I believe he actually practices sociology rather than medicine. He rewards the "deserving" laborer at the expense of the insurance carrier and in so doing uses supposedly scientific medicine to further his notion of proper social behavior. As for medical testimony, it appears to me that (1) such testimony can be purchased at a price or (2) those individuals who testify are hopelessly ignorant of the commonly known facts of cancer pathogenesis, which in turn is the result either of bad teaching in the cancer field or of dependence on casual statements heard in medical schools or encountered in textbooks on the subject. Lastly, it would oftentimes seem that the supposed expert doesn't take the trouble to reason at all. Let me illustrate: The same surgeon who will testify that mammary cancer has resulted from a single trauma will at the least provocation operate for a benign lesion of the breast and would never think of warning a patient that because of his operative trauma, which usually greatly exceeds the casual industrial trauma, she should give heed to the possibility that she will develop a cancer of the breast. The same surgeon who will do all sorts of orthopedic jobs involving chiseling into bone or insertion of such objects as ice tongs or pins or screws may testify that a blow which has left no real signs has caused an osteogenic sarcoma, although he never thinks his surgery will do so nor has he ever warned a patient with the severest form of bone trauma—a fracture—to be on the lookout for a possible sarcoma. A man testifies that a blow has caused a soft part sarcoma and yet that man and his colleagues throughout the world will do hundreds of thousands of appendectomies involving the cutting of abdominal wall musculature and observe no tumors. Another says that a malignant melanoma has followed a pin prick and yet no melanoma has ever followed the millions of venipunctures for complement fixation tests or intravenous medication. A third will say that testis cancer is the result of single trauma although the same tumor, histological-

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ly indistinguishable, appears in the ovary and no one assigns that to trauma. As far as I know I have never seen a cancer which I could logically and irrevocably assign to single trauma and, even more important than that, I do not know that any one has ever observed the development of a process which could be called "precancerous" after a trauma. The absurd efforts made in our compensation courts to emphasize the severity of traumas rests on the nonsensical point of view that there is some dividing line between the degree of trauma which will or will not cause cancer, under the popular supposition that the metabolic changes which make a cell a cancer cell require a few additional dynes for their complete florescence. Some means should be found to exclude these figments of imagination from our compensation courts and place such claims in the hands of a truly expert commission —not composed of individuals who have nothing else to do or who have political friends either within medicine or without—and make the findings of this commission binding on the compensation referee, thus avoiding time wasted at hearings, questions and insults from cheap lawyers, and the mental anguish resulting from having to listen to the testimony of ignorant doctors, that in itself, judged by medicolegal standards, might be deemed a sufficent cause for development of a glioma in the expert. I tried this in a way. That is, I wrote a few letters to people who should have been interested and didn't get anywhere and am unable to wage a one man war on the racket. It will certainly be hard to break, for, under the law, compensation is profitable to claimant, physician and lawyer, and of course in the end the public foots the bill.

—FRED W. STEWART, M.D., New York, Acting Director, Memorial Hospital for the Treatment of Cancer and Allied Diseases, in a Letter to the Editor of *J.A.M.A.*, September 9, 1944.

"Sooth for Simple Souls"

SOCIALIZED medicine will not be necessary but public medical services must be made available to all income levels to keep Americans healthy in postwar years, Harry L. Hopkins, President Roosevelt's close friend and adviser, states in a signed article in the November issue of *The American Magazine*. In his article entitled "Your Job After the War," Mr. Hopkins, who frequently has reflected administration views, advances a formula for achieving prosperity and a higher standard of living and stresses the need for better housing facilities, education and health. "Adequate medical care must be available to all income levels," he writes. "To work, men must be well. Sickness is a job-loser. The health of the American people can be improved through health insurance and increased public services. We do not need socialized medicine to do the job." Mr. Hopkins does not elaborate on this particular subject. However, in his over-all plan for postwar prosperity he proposes reduced taxation, encouragement of small business and free enterprise, higher wages, broader social security benefits, preservation of the competitive system, and government spending only to supplement individual effort.

—*American Magazine*, release.

Rome Army Air Field

HEALTH of Rome Army Air Field employees is guarded carefully from the hour they first enter the gates of the Field until the day they leave. High health standards are maintained by the staff of the Civilian Medical Dispensary through direct care of employees and, indirectly, through zealous attention to healthful working conditions. . . . The medical unit at the Reception Center, across from Gate 1, nabbed you first. There you were given a preliminary physical examination. You were weighed and measured, your throat was inspected, and then the nurse, CATHERINE BUDLONG, judged you were apparently in good enough physical condition to go on to the next stage. At the Main Dispensary, where MAJOR KENNETH D. SMITH is in charge, you were given various thorough tests and preventive inoculations. You had a blood test. You stood bare-chested before an x-ray machine and "had your picture taken." You were vaccinated, and received a typhoid immunization shot. If you showed certain symptoms, you were given additional tests as needed. . . . There are three first aid stations on the Field besides the examining unit at the gate. One is in Airplane Repair, one in Depot Supply No. 1, and the third, recently opened, is in Warehouse T-7. You probably have used the station in Airplane Repair; that's where you had your throat painted last spring, thereby checking a cold before it had a good start. You received first aid there once when you turned your ankle. You noticed one day an officer looking over your place of work and were told it was CAPTAIN HAROLD BAVLEY. He is the industrial hygiene engineer, and he makes sure you have sufficient light on your job, that ventilation is properly controlled, that no harmful fumes and vapors menace your good health. The dispensary checks all employees returning after sick leave. Anyone who has been ill more than three days must present a note from his doctor showing he has been under medical supervision. All others are checked to see they are physically able to return to work. You recall the day you patriotically struggled back to work after a bad cold, and a nurse at the dispensary discovered you still had a fever and sent you back home. You weren't nearly so well as you thought, and you were mighty glad to crawl back to bed. If you should become ill at work, you could have emergency treatment at the dispensary, which would then, if necessary, provide you with transportation home or to a hospital. If you are injured at work, the dispensary would give you first aid and transfer you to the station hospital. Until recently only military personnel were admitted to the station hospital, but now injured civilians are taken care of there. Anyone injured on duty at the Field is entitled, besides, to hospital compensation. . . . Head nurse at the dispensary is VIOLA CRUMM, who was there when the depot first started. She supervises 17 nurses. A staff of clerks takes care of the extensive paper work which must be kept concerning all patients treated. Two technicians, one civilian and one military, man the laboratory, and a nurse, DORIS STOREY, is in charge of x-ray. Chief of the dispensary, MAJOR SMITH, was connected with industrial medicine in civilian life, and since entering active duty with the Army in 1940 has served as regimental surgeon with the 166th Infantry and the 172nd Field Artillery. He was also chief of medical service at the 29th Evacuation Hospital at Camp Livingston, Louisiana, and medical director of industrial hygiene at Hill Field, Ogden, Utah. MAJOR WILLIAM SMITH is assistant in industrial hygiene. The two majors claim they don't mind the resultant confusion about their names. They can always say, "No, I didn't do it; that was the other MAJOR SMITH." CAPTAIN MARTIN E. TOLOMEO, assistant industrial surgeon, and CAPTAIN EDWARD CONNELLY, assistant to the Chief of Industrial Medicine, are also on duty at the Civilian Dispensary. DR. MICHAEL LEVITAN, a civilian physician under contract to the War Department, does part-time work at the Dispensary.

—*Rome (New York) Sentinel*, September 21

THIS MONTH

—*Continued from page 6.*

for the First Course, a mere reading of the schedule for the Third will satisfy anyone that it is entitled to, at least, the third power of praise. It marks a very significant milestone in the form and substance of this kind of teaching. . . . ONE of the characters in Hamlet spoke of the "mobled queen." "Mobled queen," said Polonius. "That's good." Thus, when we came to "Weewee the People," in the editorial on page 820: "that's good." It *is* good; it might well have been the title of the comment. The propaganda has, indeed, been a flood. Now it is becoming a deluge. Vide the release (page 854) about H. Hopkins' latest to the effect that "socialized medicine will not be necessary." Just give it another name: "health insurance," or "increased public services."

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ACTIVITIES of STATE HEALTH DEPARTMENTS

Los Angeles

PROPOSED use of phenylmercuric salicylate as a fungicide in protective coatings for electronic devices resulted in a request for data on the toxicity of this compound from the Los Angeles City Division of Industrial Hygiene. Although information concerning the toxicity to man from exposure to this substance is not available, studies of analogous phenylmercuric compounds have shown them to be skin irritants and, when inhaled in sufficient quantities, systemic poisons. Recommendations for control were based on these data, and air samples will be collected periodically to check the efficiency of the control measures.

—*Industrial Hygiene News Letter*, August, 1944.

Missouri

DENTAL factors contributing to the loss of work because of sickness and injury, merit the serious attention of industrial leaders. To assist in solving this problem, the Missouri State Board of Health is offering the advisory assistance of an industrial dental consultant to industries in the state. A bulletin has been sent to industrial plants explaining: (1) The kind of dividends a dental health program can be made to pay; (2) types of dental programs now in use in industry; (3) how dental infection may be discovered most effectively among workers; (4) how the dental program may be correlated with the medical program; and (5) minimum essentials of a good industrial dental program.

—*Industrial Hygiene News Letter*, August, 1944.

New Jersey

THE Bureau of Industrial Health of the State of New Jersey Department of Health was invited to prepare an exhibit for the New Jersey State Fair which was held September 10-16. Since the greater number of visitors were from rural areas, the exhibit was devoted principally to food processing and related agricultural industries. . . . The Bureau of Industrial Health has just completed distribution of a pamphlet on the subject of respirators. The pamphlet is attractively printed in yellow and black. The article is divided into four sections with the following headings: What is a respirator? When should respirators be worn? Who supplies, supervises and services respirators? How should respirators be handled? . . . In two years the mobile chest x-ray unit of the State Bureau of Tuberculosis Control, operating in cooperation with the Bureau of Industrial Health, has taken nearly 150,000 chest films of New Jersey workers. . . . During August, representatives of the Bureau of Industrial Health conducted an industrial hygiene survey of the maintenance shops of Fort Dix in cooperation with the office of the Post Medical Inspector.

Pennsylvania

PERSONNEL of the Bureau of Industrial Hygiene of the Pennsylvania Department of Health has completed a series of preliminary surveys covering hazards encountered in plants processing asbestos textiles. This work has been done in compliance with a request received from the War Production Board.

Vermont

THE industrial hygiene services of the State Department of Public Health have been reorganized, giving DR. R. B. AIKEN, Acting Chief, Division of Communicable Diseases, responsibility for the program. The new arrangement provides for enlargement of the scope of the program, formerly largely restricted to control of silico-tuberculosis and carried on as a function of the Tuberculosis Division. DR. AIKEN had been serving as the state's medical consultant under the previous plan. He will now be assisted by a full-time engineer, DAVID S. FALK, assigned by the U. S. Public Health Service to the Sanitary Engineering Division, with the understanding that industrial hygiene activities are his first responsibility.

—*Industrial Hygiene News Letter*, May, 1944.

Washington

INDUSTRIAL health was highlighted during August in the City of Seattle, through cooperation of the Industrial Hygiene Division, State Department of Health and the Seattle Safety Council. The plan includes radio and newspaper publicity, together with exhibits in retail stores. In planning the program, there were found duplications of inspections and conflicting recommendations for better health control made by about 20 different Federal, state and local agencies. The Division of Industrial Hygiene has been asked by representatives of all these agencies to serve as an information bureau to direct management and labor to the agency best prepared to help them in their problems and to assist in planning the coordination of services of these agencies. A "Guide to Basic Medical Service Records in Industrial Plants," has been prepared by MISS M. GRACE WATSON, Industrial Advisory Nurse, to be used to stimulate better record keeping in industrial medical units. The guide includes individual shift, and monthly summary record forms, together with instructions and suggestions for their effective use.

—*Industrial Hygiene News Letter*, August, 1944.

U. S. Public Health Service

THE U. S. Public Health Service's eighth post-graduate course in venereal disease control will be conducted at the Public Health Service Medical Center, Hot Springs, Arkansas, October 19 to November 8, for health officers and private physicians cooperating with state and local health department venereal disease control programs. Lectures and demonstrations will be given by outstanding specialists. Physicians who will conduct the course are DR. UDO J. WILE, Ann Arbor, Michigan; DR. RUTH BORING THOMAS, New York City; DR. AUSTIN V. DEIBERT, Fort Douglas, Utah; DR. RICHARD C. ARNOLD, Staten Island, New York; DR. EUGENE A. GILLIS, New Orleans; and DR. ROBERT B. GREENBLATT, Hot Springs.

Third Post-graduate Course in Industrial Medicine

—Long Island College of Medicine—

Medical Administration in Industry

MELVILLE H. MANSON, M.D.
CASSIUS H. WATSON, M.D.

Monday, October 16

ADDRESS of Welcome—J. A. CURRAN, M.D., President and Dean, Long Island College of Medicine.

Introductory Remarks—CASSIUS H. WATSON, M.D., Director, Vanderbilt Clinic, Columbia-Presbyterian Medical Center, New York City.

"The Organization of the Industrial Medical Department"—MCIVER WOODY, M.D., Medical Director, Standard Oil Company of New Jersey, New York City.

Tuesday, October 17

INDUSTRIAL Medical Service from Management's Viewpoint"—I. DENT JENKINS, Personnel Manager, Harrison Radiator Divison, General Motors, Lockport, New York.

"Industrial Medical Records"—CHARLES E. MARTIN, M.D., Medical Director, Bell Telephone Laboratories, New York City.

Wednesday, October 18

THE EVALUATION of the Health Status of the Worker"—WILLIAM A. SAWYER, M.D., Medical Director, Eastman Kodak Company.

"Health Education in Industry"—FRANK M. GATTO, M.D., Director of Health Conservation, Westinghouse Electric & Manufacturing Company, Pittsburgh, Pennsylvania.

Thursday, October 19

PROTECTING the Place of Employment"—J. J. BLOOMFIELD, Senior Sanitary Engineer, Chief, Field Operations Section, U. S. Public Health Service, Federal Security Agency, Washington, D. C.

Friday, October 20

ABSENTEEISM, Analysis and Methods of Control"—DANIEL L. LYNCH, M.D., Medical Director, New England Telephone & Telegraph Company, Boston, Massachusetts.

"Industrial Medical Department Relationships with the Medical Profession and Outside Agencies—EDWARD C. HOLMBLAD, M.D., Managing Director, AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, Chicago.

Internal Medicine in Industry

FREDERICK H. SHILLITO, M.D., Chairman

Monday, October 16

THE VALUE of Newer Medical Procedures in Industry"—WILLIAM DOCK, M.D., Professor of Medicine, Long Island College of Medicine.

"Medical Emergencies in Industry"—LEMUEL C. MCGEE, M.D., Medical Director, Hercules Powder Company, Wilmington, Delaware.

Tuesday, October 17

THE MEDICAL Aspect of Placement of the Handicapped Individual"—C. O. ROBINSON, M.D., Medical Officer, Atlantic Division, Pan American Airways, New York City.

"Peripheral Vascular Diseases"—A. WILBUR DURYEE, M.D., Associate Clinical Professor of Medicine, College of Physicians and Surgeons, Columbia University.

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Wednesday, October 18

ALLERGY in Industry"—MATTHEW WALZER, M.D., Attending Allergist, Brooklyn Jewish Hospital.

"Nutrition in Industry"—ROBERT S. GOODHART, M.D., Chief, Industrial Feeding Programs Division, Civilian Food Requirements Branch, WFA, Washington, D. C.

Thursday, October 19

INDUSTRIAL Health in the Tropics"—FREDERICK H. SHILLITO, M.D., Medical Director, Atlantic Division, Pan American Airways, New York City.

"Health Hazards of Maritime Service"—FRANCIS N. KIMBALL, M.D., Medical Director, American Export Lines, New York City.

Friday, October 20

RESPIRATORY Infections in Industry"—H. H. FELLOWS, M.D., Assistant Medical Director, Metropolitan Life Insurance Company.

"Problems of Abnormal Atmospheric Pressure"—A. R. BEHNKE, Commander, M.C., U.S.N., Naval Medical Research Institute, Bethesda, Maryland.

Industrial Surgery

S. POTTER BARTLEY, M.D., Chairman:

Monday, October 23

THE VARIOUS Factors Producing Extended Periods of Disability in the Injured Workman"—ANTHONY AVATA, M.D., Medical Director, Hartford Accident and Indemnity Company, New York City.

"The Mind of the Injured Workman and its Effect on Disability Periods"—FOSTER KENNEDY, M.D., Professor of Clinical Medicine (Neurology), Cornell University Medical College.

"The Importance of Physiological Alterations in Trauma"—GEORGE B. RAY, PH.D., Professor of Physiology and Pharmacology, Long Island College of Medicine.

Tuesday, October 24

THE PRINCIPLES in the Treatment of Fractures of the Fingers: Simple and Compound: Amputations"— G. J. CURRY, M.D., Director of Traumatic and Orthopedic Surgery, Hurley Hospital, Flint, Michigan.

"Infections of the Hand"—ROBERT F. BARBER, M.D., Professor of Clinical Surgery, Long Island College of Medicine.

Wednesday, October 25

CEREBRAL Concussion: Its Management and the Post Concussion State"—E. JEFFERSON BROWDER, M.D., Clinical Professor of Surgery, Neurology, and Psychiatry, Long Island College of Medicine.

"The Significance of Protein Changes in Trauma"—EDWARD MUNTWYLER, PH.D., Professor of Biological Chemistry, Long Island College of Medicine.

"Psychoneurosis Following Head Injuries"—CHARLES A. MCKENDREE, Captain, M.C., U.S.N.R., U. S. Naval Hospital, Brooklyn.

Thursday, October 26

RECONSTRUCTION Surgery of the Injured"—JOHN J. MOORHEAD, M.D., Emeritus Professor of Surgery, New York Post-Graduate Medical School, Columbia University.

"Cinemaplastic Amputations in the Industrial Amputee"—S. POTTER BARTLEY, M.D., Assistant Clinical Professor of Surgery, Long Island College of Medicine.

"Rehabilitation and Convalescence of the Injured"—J. H. POWERS, M.D., Attending Surgeon, Mary Imogene Bassett Hospital, Cooperstown, New York.

Friday, October 27

SPRAIN of the Lower Back"—JOSEPH B. L'EPISCOPO, M.D., Professor of Clinical Orthopedic Surgery, Long Island College of Medicine.

"Diagnosis and Management of Disc Injuries"—PAUL MAGNUSON, M.D., Associate Professor of Surgery, Northwestern University Medical School, Chicago.

Occupational Diseases

IRVING GRAY, M.D., Chairman:

Monday, October 23

OCCUPATIONAL Diseases: Definition: Interpretation of Compensation Laws in the Various States"—HENRY D. SAYER, General Manager, Compensation Insurance Rating Board, New York City.

"Criteria for Determining the Presence of Occupational Disease"—IRVING GRAY, M.D., Chairman, Sub-Committee on Industrial Medicine, Kings County Medical Society, Brooklyn.

Tuesday, October 24

TOXIC GASES, Fumes and Vapors"—LEONARD GREENBURG, M. D., Executive Director, Division of Industrial Hygiene, New York State Department of Labor, New York City.

"Industrial Solvents"—MAY R. MAYERS, M.D., Chief of Medical Unit, Division of Industrial Hygiene, New York State Department of Labor, New York City.

Wednesday, October 25

INDUSTRIAL Dermatoses"—LOUIS SCHWARTZ, M.D., Medical Director, U. S. Public Health Service, Chief, Dermatoses Investigations Section, Division of Industrial Hygiene, National Institute of Health, Bethesda, Maryland.

Thursday, October 26

DUSTS in Relation to Diseases of the Lungs"—LEROY U. GARDNER, M.D., Director, Saranac Laboratories for the Study of Tuberculosis, Edward L. Trudeau Foundation, Saranac, New York.

Friday, October 27

INTOXICATION by Metals"—ROBERT A. KEHOE, M.D., Director, Kettering Laboratory of Applied Physiology, Universty of Cincinnati College of Medicine.

Problems of Post-War Industrial Reconversion

—Personal Relationships in Industry—

LYDIA G. GIBERSON, M.D., Chairman:

Monday, October 30

JOHN HERSEY'S Article—'Joe Is Home Now'—This Is What We Are Talking About"

(a) "Modern Conception of Psychiatry and its Role in Industry"—LYDIA G. GIBERSON, M.D., Industral Psychiatrist, Metropolitan Life Insurance Company, New York City.

(b) "Modern Conception of Psychiatry and its Place in a Medical School Curriculum"—HOWARD W. POTTER, M.D., Professor of Clinical Psychiatry, Long Island College of Medicine.

MANAGEMENT's Responsibility for Personal Relationships"

(a) "Medical Viewpoint"—J. J. WITTMER, M.D., Medical and Personnel Director, Consolidated Edison Company of New York.

(b) "Personnel Viewpoint"—GUY ARTHUR, Personnel Director, American Thread Company, New York City.

FACE to Face—What of the Interviewer?" ALICE RICE COOK, Supervisor, Women's Counselling, Arma Corporation, Brooklyn.

"Psychiatry in Action"—Moving Picture.

Tuesday, October 31

TRIAL by Ordeal":

(a) "From a Neuropsychiatrist's Viewpoint"—HUBERT S. HOWE, M.D., Clinical Professor of Neurology, College of Physicians and Surgeons, Columbia University.

(b) "From an Industrialist's Viewpoint"—HOWARD COONLEY, Chairman of the Board, Walworth Company, New York City, Director of the Conservation Division, WPB.

Wednesday, November 1

WOMAN'S Peacetime Role"—ELINORE M. HERRICK, Director of Personnel and Labor Relations, Todd Shipyards Corporation, New York City.

"Psycho-Neurosis":

(a) "Its Impact on Industry"—GORDON A. EADIE, M.D., Plant Physician, General Motors Corporation, Linden, New Jersey.

(b) "Psychiatric Aspects of Civilian Rehabilitation"—THOMAS A. C. RENNIE, M.D., Associate Professor of Psychiatry, Cornell University Medical College.

Thursday, November 2

EMOTIONAL First Aid Stations in Industry": (a) "On the Job"—L. HOLLAND WHITNEY, M.D., Medical and Employee Service Director, Sperry Gyroscope Company, Great Neck, Long Island: GEORGE M. LOTT, M.D., Director, Mental Hygiene Division, Suffolk County Health Department, Riverhead, Long Island.

(b) "Off the Job"—JOHN C. KINDRED, M.D., Consultant, River Crest Sanitarium, Astoria, Long Island.

THE ROAD Back":

(a) "Personnel's Responsibility"—WILLIAM J. BARRETT, Assistant Vice-President, Group Division, Metropolitan Life Insurance Company, New York City.

(b) "Medical Responsibility"—CHRISTOPHER LEGGO, Surgeon (R.), U. S. Public Health Service, Columbus, Ohio.

Friday, November 3

A HEALTH Program for the Merchant Marine"—FLORENCE POWDERMAKER, Surgeon (R.), U. S. Public Health Service, Chief of Health Education, R. M. O. War Shipping Administration, New York City; DANIEL BLAIN, Senior Surgeon (R.), U. S. Public Health Service, Department Medical Director, War Shipping Administration, New York City.

"America's Postwar Potential"—Speaker to be announced.

Morning Clinics

Tuesday, October 17

THE ORGANIZATION of the Industrial Medical Department"—In charge: C. E. MARTIN, M.D., Medical Director. Place: American Telephone & Telegraph Company; Bell Telephone Laboratories, New York City.

Wednesday, October 18

MEDICAL Service to Industrial Workers"—In charge: W. C. ECKES, M.D., Assistant Medical Director. Place: Consolidated Edison Company of New York, New York City.

Thursday, October 19

INDUSTRIAL Nursing"—In charge: R. C. KIMBALL, M.D., Assistant Medical Director, Consolidated Edison Company of New York. Place: Long Island College of Medicine.

Friday, October 20

SAFEGUARDING the Health of the Worker"—In charge: L. HOLLAND WHITNEY, M.D., Medical and Employee Service Director. Place: Sperry Gyroscope Company, Great Neck, Long Island.

Monday, October 23

SURGERY of Trauma"—In charge: IRWIN E. SIRIS, M.D., Assistant Clinical Professor of Surgery, New York University College of Medicine. Place: Bellevue Hospital, New York City.

Tuesday, October 24

SURGERY of Trauma"—In charge: S. POTTER BARTLEY, M.D., Assistant Clinical Professor of Surgery, Long Island College of Medicine. Place: Long Island College Hospital, Brooklyn, New York.

Wednesday, October 25

THE NELSON Plan for Rehabilitation of Wounded Veterans"—In charge: ROBERT A. NELSON, Executive Vice-President; V. M. MYERS, M.D., Medical Director, Arma Corporation, Brooklyn, New York.

Thursday, October 26

INJURIES to the Head and Back"—In charge: E. JEFFERSON BROWDER, M.D., Clinical Professor of Surgery, Neurology and Psychiatry, Long Island College of Medicine. Place: Kings County Hospital, Brooklyn, New York.

Friday, October 27

SURGERY of Trauma"—In charge: LEO FASKE, M.D., Attending Surgeon. Place: Cumberland Street Hospital, Brooklyn.

Monday, October 30

THE OPERATION of the Industrial Hygiene Division of the State of New York"—In charge: LEONARD GREENBURG, M.D., Executive Director. Place: New York State Labor Department, New York.

Tuesday, October 31

INDUSTRIAL Dentistry"—In charge: DOUGLAS B. PARKER, M.D., D.D.S., Associate Professor of Oral Surgery, School of Dental and Oral Surgery, Columbia University. Place: Long Island College of Medicine.

Wednesday, November 1

THE INDUSTRIAL Physician's Responsibility under Workmen's Compensation"—In charge: MICHAEL J. MURPHY, Deputy Industrial Commissioner in Charge of Workmen's Compensation. Place: New York State Department of Labor, New York.

Thursday, November 2

INDUSTRIAL Radiology"—In charge: A. L. LOOMIS, BELL, M.D., Professor of Clinical Radiology, Long Island College of Medicine. Place: Long Island College of Medicine.

Friday, November 3

INDUSTRIAL Opthalmology"—In charge: FRANK E. MALLON, M.D., Assistant Clinical Professor of Ophthalmology. Place: Long Island College of Medicine.

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The Pre-placement Skin Patch Test

—Present Status in Industry—

HARRY KEIL, M.D.,
New York City

THE patch test has assumed great importance medically, industrially and legally. It is a highly informative procedure when properly performed and interpreted. In some industries the turnover of labor due to contact dermatitis based on hypersensitiveness is much greater than is generally supposed. Accurate statistics on this point are difficult to obtain, but recent wide interest in prophylactic medicaments and preparations is ample evidence of industry's attempt to cope with the problem of contact dermatitis. Industry has looked forward to the use of a test by which workers could be accurately classified as desirable or undesirable for their particular jobs. However, the views on the value of the pre-employment patch test, better described here as the pre-placement test, have been divergent. In general, American dermatologists seem not to favor the use of this test, whereas European dermatologists are more favorably disposed to recommend this procedure for the purpose of hiring workers. Because of the importance of the problem, the divergent opinions, and the broad conclusions which have been drawn by both camps, it seems desirable to review this subject with the intention of showing under what special circumstances the test can be used to advantage in industry.

Several fundamental principles must be understood in evaluating the use of the patch test. It is primarily a method for detecting cutaneous (epidermal) hypersensitiveness to a chemical. It is not, and never was, intended to be employed to detect or to evaluate primary irritation, such as a burn due to caustic lime or to gasoline; and it has but a very limited field of application in cases of industrial folliculitis. This test requires knowledge of correct concentrations and their effects on control subjects. The patch test is an excellent method of detecting either present or past hypersensitiveness to a chemical, but a single test gives no precise information on the question of whether the patient will or will not become hypersensitive to the substance tested. When properly performed, the incidence of untoward effects, some of which will be mentioned later, are minimal. Its usefulness has been extended in several directions. Thus, it is becoming customary, before new materials are placed on the market, to require that these be tested on human skins in a certain manner; this involves actually a more severe exposure than in the case of the ordinary patch test, because the period of application is longer and because a second test is made to determine whether the skin has become sensitized in the interim. In clinics and in private practice patients are often tested with various medicaments for the purpose of detecting past or present hypersensitiveness; this procedure yields information regarding other medications to which the patient may not be hypersensitive. In many instances in which the diagnosis is doubtful, routine patch tests with a series of the most common allergens are often carried out, and it is not rare to discover the cause by this means where other methods have failed.

The pre-placement patch test, by which is generally meant a single test, has not been regarded with favor by American dermatologists. Thus, Warren[1] considered it of little or no use, not sufficiently informative, dangerous on occasion, and not the counterpart of clinical exposure. Downing[2] listed a number of objections on the basis of replies to a questionnaire, and concluded that the procedure was not practical. It is the purpose of this paper to discuss these objections which, it is my belief, give in general one side of the picture only.

THE chief objections to pre-placement patch testing are:

1. The test may be positive and the patient may sue the physician for the blemish or the company if employment is refused. This seems to be an unwarranted reason, for, by the same token, no tests of any sort could be made. Properly performed, the patch test can be a source of valuable information to the patient, the physician and industry under the conditions later to be defined. The objection to patch tests is valid when the procedure is improperly carried out, particularly when primarily irritating concentrations are used, and this holds for such testing under most circumstances. In any case the patient should be told to remove the patch or patches if unable to tolerate them owing to intense itching or other untoward manifestations. The observer should have a good idea of the nature of the materials tested; in this way proper concentrations may be prepared, and the observer will know what to expect.

There are reports in which a large proportion of hypersensitive persons showed focal flare-ups, sometimes so severe as to necessitate hospitalization; perusal of such reports indicates that this happened chiefly because the concentrations used were much too strong. Such occurrences are apt to influence industry against the patch test itself, but this would be unfair criticism since the untoward effects were, at least in the aforementioned instance, due to improperly selected concentrations. There is no reason for a "false positive" reaction giving a sense of uneasiness to workers or a "false negative" causing an unwarranted feeling of security from any future dermatitis, if the employee understands the general purpose of the patch test. Indeed, the terms "false positive" and "false negative" are without meaning unless the observer defines them.

2. The application of a patch test may sensitize the patient to the substance used. This is true within limits, but the incidence can be reduced to a minimum when proper concentrations are applied and the observer is familiar with the sensitizing potentialities of the chemicals. Industry should not confuse scarifying procedures with the patch test, for sometimes the skin is scarified as a preparation for the latter. This modification has, at best, only a limited value in detecting the type of hypersensitiveness characteristic of contact dermatitis (contact eczema), is probably more capable of inducing sensitization than the application of a single patch, and may provoke flare-ups with fresh lesions and other disturbing manifestations, particularly in persons with pronounced hypersensitiveness. While the evidence on this point cannot be backed by statistical data, clinical observation teaches that in many instances breaks in the continuity of skin may be an important predisposing factor in inducing sensitization. For these reasons scarifying procedures are best avoided. The same holds true for the use of primary irritants or substances in primarily irritating concentrations; indeed, artificial sensitization in man and lower animals is often best accomplished by the prior use of primarily irritating substances (as soft soap) or primarily irritating concentrations of potent allergens. This does not mean that every primary irritation is inevitably followed by sensitization to that substance, but it does mean that this complica-

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tion is more apt to occur under these circumstances.

A high concentration of a chemical may induce sensitization without any immediate subjective or objective evidence of primary irritation. Bonnevie,[3] using 10% paramidophenol in lanolin, obtained 20 positive reactions in 345 cases of "idiosyncratic" eczema, but 14 of these responses were delayed for relatively long periods of time (induced sensitization by the patch test). When, however, the proper concentration of 2% paramidophenol was applied in patch tests, he obtained only five positive reactions in 625 eczemas, and only one of these was a delayed response of type attributable to induced sensitization. Hence, even a concentration of 2% paramidophenol was capable of sensitizing one person out of 625 cases of eczema. This may be considered a small percentage in view of the potency of this substance as a sensitizer and in view of the type of case tested (multiple sensitization not rare in eczemas of "idiosyncratic" origin). Possibly, this may be a conservative estimate of the incidence of sensitization by the patch test, for such evidence of sensitization may not become evident until much time has elapsed. Perusal of the data furnished by Bonnevie indicates that his patients were carefully watched for such signs. I have observed an instance in which 2% paraphenylene diamine in petrolatum induced sensitization in a patient after a lapse of about two weeks. It may be concluded that, even with proper concentrations and in the absence of subjective and objective manifestations of primary irritation, sensitization may be provoked in a small percentage of persons with a single patch test involving the use of a potent allergen. However, my views are in general agreement with Sulzberger's opinion[4] that "patch testing does not as a rule sensitize anyone who was not extremely likely to have become sensitized in his ordinary pursuits and upon ordinary clinical exposure to the same substance." There is reason, nevertheless, to exercise caution when potent allergens are applied in too high concentration and also in cases where such allergens are used on two or more occasions, even though in the proper strengths.

A person with a positive patch test, obtained either *ab initio* or induced artificially, is not a suitable candidate for an occupation in which this substance is apt to come in contact with the skin. Utilizing the principle of group reactions, it would be wise to exclude such persons from an industry in which related chemicals are handled. In the case of sensitization to paraphenylene diamine, the worker should not be allowed to handle aminophenols, other phenylene diamines and substances that may break down into these compounds. It is true that group reactions to chemically related compounds are, as a rule, weaker and may even be absent in cases showing remarkably specific hypersensitiveness. Thus, I have encountered a laboratory worker who had a contact eczema due to handling the dimethyl derivative of paraphenylene diamine; yet, so specific was the reaction that paraphenylene diamine itself gave a negative patch test. Had this person sought my advice about entering an industry in which paraphenylene diamine was handled, I would have urged her to forego such employment. This principle has been used to great advantage in cases of known hypersensitiveness to a particular substance, such patients being cautioned not to use medicaments which are chemically related or which are capable of being broken down in the body or in the skin into components related to the specific allergen. In this sense, at least, the patch test is a method capable of yielding valuable information.

3. The patch test may be positive, yet the patient may be able to do his usual work involving this allergen. This is also true within limits. Wedroff[5] found that a small percentage of nickel platers showed positive reactions to relatively high concentrations of nickel chloride (8% alcoholic solution) applied to the skin by the drop technic, yet these persons had apparently never had clinical manifestations due to nickel. On the other hand, Wedroff recorded that persons showing nickel dermatitis gave positive reactions to much higher dilutions of nickel chloride. Such data show the importance of quantitative tests.

Silverberg and Heimann[6] patch tested nine persons who had asthma caused probably by paraphenylene diamine, but no present or past evidence of dermatitis. Three patients in this group showed strongly positive responses to 2% paraphenylene diamine in vaseline and of these only one gave mild positive reactions to paramidophenol and paratoluylene diamine. This confirmed R. L. Mayer's observation[7] that positive patch tests may be obtained in patients suffering from asthma due to paraphenylene diamine. A reasonable explanation is that such workers were not sufficiently exposed to the chemical in question to exceed a threshold value necessary for the acquisition of contact dermatitis. The results reported by Silverberg and Heimann would have been more informative had their cases been tested with the furs actually handled at the time and had quantitative tests been made.

On the other hand, Silverberg and Heimann furnished the following data that show the importance of patch tests. Fifty workers in a fur dyeing establishment were patched with a number of aminophenols and phenylene diamines. These persons were unaffected by dermatitis or asthma. In this group all gave negative reactions, except three; of the latter, two showed weak reactions (2 plus) to o-amidophenol and one a weak response to paraphenylene diamine (2 plus). Of the three reactors, the last-named developed an occupational dermatitis six months later due to handling wet furs. In an additional group of 10 workers who had physical findings or a history of recurrent dermatitis, nine showed a positive patch test to paraphenylene diamine or o-amidophenol. Again, it would have been of interest to test these persons with the furs actually handled at the time of examination. That workers in the fur industry continue at their jobs is probably due to the relative mildness of the cutaneous lesions and the hope of becoming spontaneously desensitized. Such persons are apt to take better care in avoiding an undue degree of contact. The data recorded in reference to fur dyeing must be evaluated in the light of the following complications: (1) the different ways in which furs are dyed; (2) the variability in the substances used for dyeing and the degree of oxidation; (3) the actual substance and the manner in which it sensitizes are still subjects of dispute. I have on many occasions warned patients to forego employment in this industry, only to have them return with a contact dermatitis due to renewed contact with the dyes; the rapidity with which this occurred depended essentially on the opportunities for contact, and such conditions are variable, complicated and difficult to unravel.

Do these data depreciate the significance of the patch test? Practically all observers agree that truly positive reactions are specific in the sense that these indicate hypersensitiveness to the substances in question. The literature contains reports in which plus-minus reactions were given undue weight. Such grades of response should be checked at some subsequent time in order to assess their significance. The execution and reading of patch tests involving, for example,

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paraphenylene diamine are not always as simple as one may be led to believe. On the other hand, these data indicate that clinical manifestations of disease are probably dependent, in large measure, on quantitative factors which are not easy to evaluate in the individual case. The time element in the factor of degree of contact is important. Thus, in the case of nail polish dermatitis, proved by patch test and clinical course, the application of nail polish to the dorsa of the fingers requires a number of hours of contact before clinical lesions appear;[8] below this threshold of time, no cutaneous manifestations can be reproduced, and this time element probably varies within certain limits in each person. A patch test in many instances imposes a more intense contact than that afforded by the actual conditions of work. I have seen many times frankly vesicular reactions at the patch site, whereas the eruption itself was only scaly and papular.

Quantitative tests, such as those performed by Wedroff, indicate that in instances showing low grades of hypersensitiveness, the clinical contact may be below the threshold required to provoke an eruption. It is well known, however, that the degree of hypersensitiveness often increases with time, particularly in those who maintain contact with the substance in question. Some observers believe that this state of hypersensitiveness may diminish in time, but thus far the data submitted in favor of this view are far from satisfactory. There are not sufficient statistics available on the course of those who show positive patch tests, particularly in the absence of clinical manifestations, and, were such available, these would have to be correlated carefully with the actual conditions of exposure. Thus, Wedroff pointed out that persons with intense degrees of hypersensitiveness may still be able to work with strong concentrations of nickel salts, provided the process is mechanized. This is, of course, entirely different from desensitization and "hardening," although workers may consider themselves "habituated."

In my view those patients with positive reactions to patch tests but with no present clinical evidence of dermatitis are poor risks, particularly when the reactions are papular, papulovesicular or more intense. It is reasonably certain that these responses show pronounced hypersensitiveness of varying degrees, but quantitative studies must be awaited for a more precise evaluation of these reactions. It is possible that when the grade of hypersensitiveness can be shown to be low, the worker may be permitted to do work where the degree of contact is minimal, but in any case the variables, which have been previously mentioned, will still enter into this complicated problem. The value of the patch test will diminish in this respect when manufacturing processes are wholly mechanized; however, mechanization is at present not always possible or practical.

THE special circumstances under which the preplacement patch test or its equivalent may be used to advantage in industry are:

1. To eliminate instances of "latent" hypersensitiveness. By "latent" hypersensitiveness is meant those cases which are hypersensitive to a chemical or chemicals as shown by the patch test but which have no clinical manifestations to the allergen in question at the time of examination because there has been no contact or an inadequate contact with this allergen. There are other situations in which "latent" hypersensitiveness may be demonstrated, but these do not concern the present problem. There are persons who have developed hypersensitiveness to chemicals in the past, without knowledge of this, or who may have forgotten the details of their past history. Thus, in the course of routine patch testing it was discovered that a patient showed an intensely positive patch test to formaldehyde; on questioning the patient it was found that she had handled this chemical some 10 or 15 years ago and had been forced to quit work, without realizing that formaldehyde was the cause of the contact dermatitis. It would have been unwise in my view to hire such a person in an industry where, for example, phenol-formaldehyde plastics were manufactured, for it is likely that the "latent" hypersensitiveness would have become manifest after a relatively short exposure to formaldehyde. My observations in cases of contact dermatitis due to phenol-formaldehyde plastic materials have shown that most instances occur only after an exposure time of from one to two weeks or longer, indicating strongly that these patients were sensitized while on the job; however, this was not true in all cases. I have observed a patient who formerly handled phenol-formaldehyde plastics and had to quit work due to a severe itching eruption; he came to New York City where he was engaged as a molder of acrylic resins. Within a day or so, the pruritic rash recurred in greater intensity, and he therefore consulted me to find out whether he had become allergic to the acrylics. Patch tests showed that he was sensitive to formaldehyde and to several specimens of materials containing incompletely polymerized phenol-formaldehyde, whereas two specimens of methyl methacrylate (low and high polymers) gave negative results. Knowing something of the conditions in the plant, it was easy to see that this recurrence had taken place owing to the presence of phenol-formaldehyde materials on the same floor, the conditions of ventilation being far from perfect. Another worker in this concern showed essentially the same findings, and he was able to work in another establishment where only acrylics are manufactured. Both of these patients had acquired their hypersensitiveness to formaldehyde while on the job. On the other hand, I encountered an instance of severe contact dermatitis in a coin roller in which a preplacement patch test with nickel sulfate would have revealed this patient's hypersensitiveness to the nickel ion and would have spared him an attack of contact dermatitis. In this case the patient had been previously sensitized to nickel and had forgotten the prior

[NOTE: A recent example under my observation illustrates strikingly a misuse of the patch test in industry. An airplane mechanic developed an eruption on the right hand, with subsequent involvement of the face. Because of a "positive" patch test to Varsol, he was transferred to another job. When seen a year later, he still had the eruption which, on clinical grounds and history, was considered as non-occupational in origin. The patient gave sufficient information to show that the Varsol had been used in a primarily irritating concentration. This was indicated by the following evidence: (1) it had been applied undiluted; (2) the patient had experienced burning almost immediately; (3) the red mark which was produced in 24 hours soon became pigmented, and this area was still visible as a brownish discolored spot. I therefore patch tested him with 50% Varsol in liquid petrolatum. The result was negative. This showed two things: (1) the patient was not hypersensitive to Varsol; (2) in this case the prior use of a primary irritating concentration of Varsol had failed to sensitize the patient in the interim. The chief lesson involved is that no conclusions should be drawn regarding employment when primarily irritating concentrations are used. Such reactions have no meaning in this regard. If the patient's description of the reaction is correct, this would indicate that he actually showed less primary irritation than the average person tested with undiluted Varsol.]

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attacks of nickel dermatitis until a positive patch test was obtained. It is possible that a detailed history would have revealed these data, but it is unwise to rely solely on the patient's history. The principle of detecting the "latent" reactor is the basis upon which beauty parlor operators are required under the Sanitary Code to do patch tests behind the ear before dyeing the hair. Unfortunately, such operators cannot be relied upon to use the proper concentrations for testing. Nevertheless, it is interesting to see how few cases subsequently develop dermatitis from the product used for testing, though I have encountered at least one such case where, despite previous testing, the patient developed a dermatitis.

The pre-placement patch test or its equivalent has value, then, in detecting examples of "latent" hypersensitiveness. The disadvantage of the method when used for this purpose is that the number of "latent" reactors are relatively few, and, from a practical point of view, industry might generally not regard this as a worthwhile reason for widespread patch testing. Examples have been given where this procedure, used intelligently, may yield information of practical importance under special circumstances. It may be noted that a single patch test with nickel sulfate, even in a strength of 10% in water, 5% formalin (equivalent to 2% formaldehyde), and many other substances in proper concentration will not sensitize the worker except, possibly, in rare instances. Were the latter to occur, such a person would be considered an unsuitable candidate for that industry.

2. To apply the principle of group reactions in determining which industry the worker should avoid. Thus, a person hypersensitive to paraphenylene diamine should, in my view, be discouraged from entering an industry where related chemicals are made. The possibility of group reactions to chemically related substances is too great to take the risk, even though it is true that weak or negative reactions may be obtained to chemically similar substances. This principle should be made known to those who treat patients at the plant, for, in the case of a patient whose dermatitis is caused, for example, by trinitrotoluene, ointments containing picric acid should be eliminated from the medical tray. Likewise, this principle should be made known to lay persons in charge of rehabilitation centers.

3. To determine whether a substitute should be used in place of the allergen which caused the contact dermatitis. In many cases this is a practical procedure, in others this might be impractical. Two recent examples under my observation will illustrate this point.

An artist was found to be hypersensitive to a type of turpentine used as a thinner (exact nature undeterminable) in her work. She had suffered from a contact dermatitis for many months. She was unwilling to leave this job, and her employer was reluctant to part with her services. I therefore suggested that some other thinner be substituted, such as varnoline. It was impractical at this time to suggest patch testing with fractions of turpentine to determine the ingredient responsible. In any event, she was patch tested with 50% varnoline in mineral oil. The result was negative. She therefore continued to do the same work, except for the substitution of the new thinner. The eruption healed completely, despite continued work. This example is especially interesting in showing that hypersensitiveness to one type of solvent need not necessarily be accompanied by hypersensitiveness to another solvent, despite their similarities in physical properties. I make this point because the literature contains statements, founded, in my view, on inadequate evidence, that a patient allergic to one solvent will be unable to tolerate another solvent of similar physical properties. This case is not intended to show that this patient may never become hypersensitive to varnoline, but it does indicate that this patient has been able to continue her work, with economic gain for herself, her place of business and the insurance carrier.

A worker in a war plant acquired a contact dermatitis which, after investigation by means of the patch test, was found to be caused by trichlorethylene. The safety engineer, wishing to retain the services of this worker, asked me to patch test the patient with another solvent which could be used for the same purpose. The patient gave a negative reaction to the substitute solvent in 50% mineral oil. The man was able to return to the same work. Again, this does not mean that this worker may not subsequently become hypersensitive to the substitute petroleum solvent, but it does mean that the patient was able to return to the original job, except for a substitution in the type of solvent used.

THE circumstances under which the pre-placement patch test may not be valid are the following:

1. In industries where the worker is handling substances of high allergenic potency. The reason for this is that the patch test may subject the patient to a greater exposure than his actual working conditions. The exact status of this point must still be determined precisely, and it is possible that this view may need to be revised when knowledge of concentrations and their effects are better known. Some observers note the possibility of sensitizing the patient to rare chemicals. This is, of course, less harmful than sensitizing a person to chemicals met with in ordinary life. However, it is difficult to be certain when a chemical is really rare. Thus, fulminate of mercury is unlikely to be handled by the average person, yet the principle of group reactions would lead one to suspect that a person hypersensitive to ammoniated mercury or bichloride of mercury would not be a suitable subject for work in an industry where mercury fulminate was handled. Picric acid may have been considered a rare substance at one time, but it can be encountered in various ointments or in the form of butesyn picrate. The diethylene glycol ester of wood rosin is a rare substance, but a fair percentage of those who wore shorts and other apparel finished with this substance are now sensitized to it; if such a person sought employment in a factory where other esters of rosin were handled, it would be wise to consider the possibility of group reactions here.[9] All of these examples show the interrelationship between contact in industry and in ordinary life.

2. This test should not be used to determine degrees of primary irritation. The patch test was never meant to be employed for this purpose, and it is, moreover, subject to error when used in this way. The possibility of sensitization to a substance used in primarily irritating concentrations is not remote, and this holds for chemicals or materials that have allergenic properties in addition to the ability to cause primary irritation when used in high concentrations. There are circumstances where such tests might be carried out on a relatively few cases for experimental purposes, but this should not be universalized in industry.

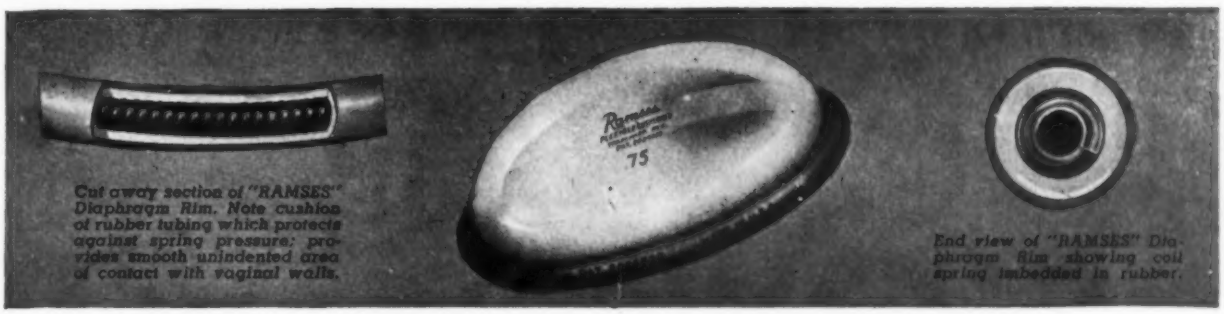
3. The test cannot be used at present for determining the possibility of future hypersensitiveness to a substance. A negative patch test, particularly when based on the single test, does not eliminate the possibility that the patient may yet become hypersensitive

What's In A RIM

The coil spring in the rim of the "RAMSES"* Diaphragm is flexible in all planes, permitting adjustment to muscular action.

The spring used has sufficient tension to insure close contact with the vaginal walls during use.

The spring is covered with soft rubber tubing which serves to protect the patient against undue spring pressure. Also provides a wide unindented area of contact.



Cut away section of "RAMSES" Diaphragm Rim. Note cushion of rubber tubing which protects against spring pressure; provides smooth unindented area of contact with vaginal walls.

End view of "RAMSES" Diaphragm Rim showing coil spring imbedded in rubber.

"RAMSES" Flexible Cushioned Diaphragms are supplied in sizes ranging from 50 to 95 millimeters. They are available through any recognized pharmacy. Only the "RAMSES" Diaphragm has the patented flexible cushioned rim.

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to the chemical involved. The value of the two-test method, in which the second test is made after a suitable interval of time, has not been used sufficiently to permit evaluation of the advantages or disadvantages of the method in gauging future hypersensitiveness. It is a procedure that merits study.

4. It is questionable whether patch tests should be carried out with complex materials, unless the observer has a good idea of the nature of the ingredients. On the other hand, when separate ingredients are tested, conclusions cannot necessarily be drawn regarding the effects of the combination. For example, patch tests may be negative to a chemical and to a wetting agent, each used separately; yet the combination may be a potent sensitizer because, in combination with the wetting agent, the physical attributes of the principal substance may be considerably modified.

5. When industrial processes become fully mechanized, the value of the patch test in industry will probably diminish in some degree.

IN PATCH testing, whether done in civilian life or in industry, the cardinal rule must be that those who perform these tests should be fully familiar with the proper concentrations to be applied. The pre-placement patch test or its equivalent should not be dismissed summarily as without value, unless all the surrounding circumstances are known. The purpose of this paper has been to indicate some of the uses to which this test can be applied. Many problems are still untouched and unsolved, and studies on the quantitative aspects of patch testing hold great promise for the future in enlarging the scope of our knowledge of contact dermatitis due to external "irritants."

[ACKNOWLEDGEMENT: My thanks are due to DR. CAREY P. MCCORD and DR. LAIRD S. VAN DYCK for valuable suggestions and criticisms.]

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Discussion

FOLLOWING is the consensus of the comments of the experts on industrial dermatitis to whom DR. KEIL'S article was submitted:

REGARDING the statement that "it is becoming customary, before new materials are placed on the market, to require that these be tested on human skins in a certain manner; this involves actually a more severe exposure than in the case of the ordinary patch test, because the period of application is longer and because a second test is made to determine whether the skin has become sensitized in the interim," actual practice has shown in industry that industrial exposures are much more severe than an exposure to the patch test would be because many added factors such as friction, trauma, etc., play a role. As a matter of fact, this is one of the reasons why pre-employment patch tests fail in weeding out those who may become sensitized.

THE author says: "The test may be positive and the patient may sue the physician for the blemish or the company if employment is refused. This seems to be an unwarranted reason, for, by the same token, no tests of any sort could be made." No censure can be legally brought against a physician who uses the patch test for diagnosis, but the pre-employment patch test is not a diagnostic patch test.

AGAIN: "Industry should not confuse scarifying procedures with the patch test, for sometimes the skin is scarified as a preparation for the latter." It is stressed in all of the writings about the patch test, by industrial dermatologists and others, that the test must be performed on the unbroken skin.

WITH reference to the following: "However, my views are in general agreement with Sulzberger's opinion that 'patch testing does not as a rule sensitize anyone who was not extremely likely to have become sensitized in his ordinary pursuits and upon ordinary clinical exposure to the same substance.'" Here are the main objections to pre-employment patch tests. It is agreed by nearly all workers who are familiar with industry that while there is a possibility of sensitization by means of the patch test, those sensitized are almost the majority of those tested who would give negative reactions and still develop dermatitis. In addition, the technique for employing the patch test as a method for weeding out those who would become sensitized is too often wrong. Owing to this possibility, a technique has been developed by Schwartz which has been found practical in hundreds of instances carried out to avoid the use of irritants in clothing, etc. The proper method for determining induced sensitivity is to first do a patch test which is left on for 24 to 48 hours, depending on the material used. Sensitization will develop, if at all, after five days and can only be determined by a second series of patch tests performed after the sensitivity has developed. The majority of patients sensitized by the first series of patch tests will show no reaction at the patch test site after the sensitivity has developed. There are many instances of actual dermatitis where the history plus repeated exposures left no doubt as to the contact responsible for the dermatitis. Yet, the patch test with the concentration to which the worker was exposed gave a very slightly positive reaction. This was due to the fact that there were other factors, such as friction plus total concentration of exposure, which could not be reproduced under conditions of the patch test.

THE author states: "It would have been unwise in my view to hire such a person in an industry where, for example, phenol-formaldehyde plastics were manufactured, for it is likely that the 'latent' hypersensitiveness would have become manifest after a relatively short exposure to formaldehyde." Some would consider this an attempt to bolster an argument by histories which do just the opposite. It is stated that sensitization occurred after the worker had been exposed to formaldehyde for some time after he started work, and for the same reason not only would the worker have to be patch tested with all of the materials which he is likely to meet in his new job, but with every material with which he ever came in contact in his past period of employment if there were the slightest possibility of another contact in his new place of employment.

AS TO THE author's comment: "That workers in the fur industry continue at their jobs is probably due to the relative mildness of the cutaneous lesions and the hope of becoming spontaneously desensitized. Such persons are apt to take better care in avoiding an undue degree of contact. It is well known, however, that the degree of hypersensitiveness often increases with time, but thus far the data submitted in favor of this view are far from

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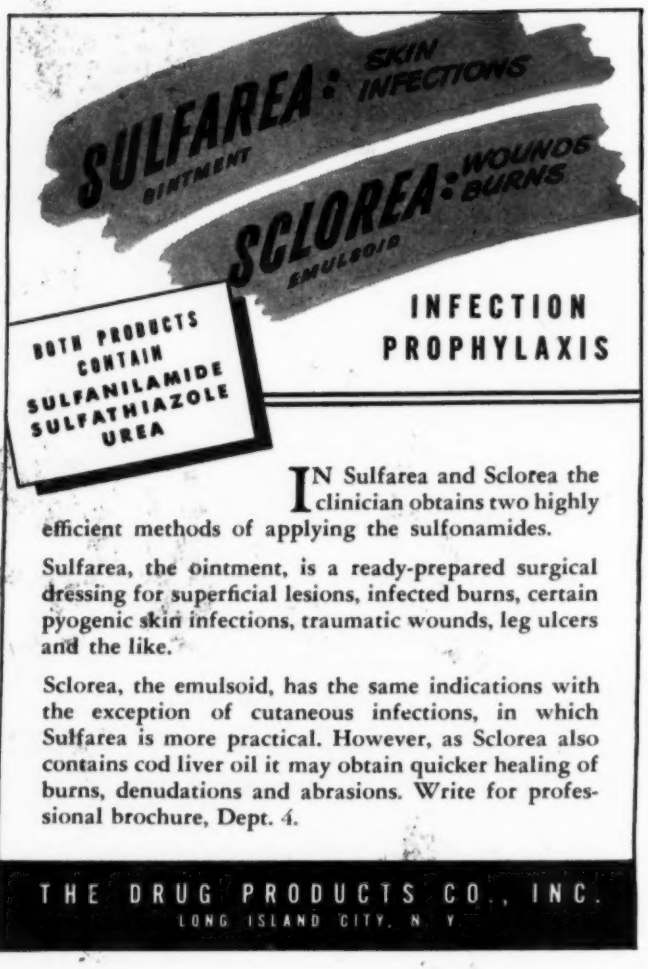
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satisfactory. There are not sufficient statistics available on the course of those who show positive patch tests, particularly in the absence of clinical manifestations, and, were such available, these would have to be correlated carefully with the actual conditions of exposure." It has been learned from experiences in the war industries that even those workers showing a demonstrable hypersensitivity as proved by the history and the patch test can become "hardened" or hyposensitive by continued exposure. One has only to read the papers by Norwood about tetryl and TNT, as well as the numerous instances cited by Schwartz, to see that that is so. Experience bears out these observations. Many workers would have been deprived of an opportunity to continue their acquired skills if the fact that they had positive patch tests were used as a criterion for their future employment.

FURTHER on: "The principle of detecting the 'latent' reactor is the basis upon which beauty parlor operators are required under the Sanitary Code to do patch tests behind the ear before dyeing the hair." This is a most unfortunate procedure, because sensitization occurs after the hair has been dyed and might only prove of value in those who have already been exposed to hair dyes. The law fails to discriminate between those who have had repeated hair dyeing and those who are undergoing the experience for the first time.

AGAIN: "The pre-placement patch test or its equivalent has value, then, in detecting examples of 'latent' hypersensitiveness." All of us have latent potentialities for sensitization. All that is necessary is sufficient exposure for sufficient length of time.

FINALLY: "A worker in a war plant acquired a contact dermatitis which, after investigation by means of the patch test, was found to be caused by trichlorethylene." It would be a great advantage if some petroleum solvent could take the place of trichlorethylene as a degreasing agent. Industry is forced to use this toxic material because by its very nature the part to be degreased is thoroughly dried. This cannot take place when a petroleum solvent is used. It would be interesting to know just how a patch test with a volatile substance like trichlorethylene can be carried out unless very special modifications are used.

THERE are many controversial points in the matter of patch tests and their interpretation. Certain theories concerning hypersensitivity and allied states are accepted, but the status of allergic reactivity in the field of industrial dermatology is as yet so unsettled as advisedly to minimize the conflicting theories shunted on to the general practitioner. Also, in too much discussion, there lurks the possibility of medicolegal dynamite.

MORE NEWS

DR. DAVID A. MCCOY, Director of Industrial Medicine for Liberty Mutual Insurance Company, Boston, having gone into the Navy, DR. DWIGHT D'HARA, Professor of Preventive Medicine, Tufts College Medical School, and Chairman of the Massachusetts Medical Society's Committee on Industrial Health, has taken his place on a consulting basis.

Ambulatory Fracture Association

THE Ambulatory Fracture Association—"For the Study of Skeletal Pinning and External Fixation"—is holding its Fifth annual meeting at the Palmer House, Chicago, October 13-14, with the following program:

Friday, October 13

ALBERT W. COLLINGS, M.D., Chairman:
Opening Session—H. W. WELLMERLING, MD., President.
"Treatment of Facial Fractures"—WAYNE B. SLAUGHTER, M.D., D.D.S., Chicago, Illinois.
"Review Cases"—BENNETT R. PARKER, M.D., Chicago.
"Femoral Shortening"—DANIEL H. LEVINTHAL, M.D., Chicago, Illinois.
Round Table Discussion—CHARLES P. BLAIR, M.D., Monmouth, Illinois.

A. H. DIEHR, M.D., Chairman:
"X-Rays and Patients"—JAMES A. VALENTINE, M.D., Chicago.
"Complicated and Ununited Fractures"—HARRY MOCK, SR., M.D., St. Luke's Hospital, Chicago.
"Skeletal Pinning"—HENRY H. SCHWARZELL, M.D., Columbus, Ohio.
"Leg Fractures"—J. R. SHARP, M.D., Oil City, Pennsylvania.
"Os Calcis Fractures"—ROGER POBORSKY, M.D., Medical Director, Electro-Motive Division of General Motors, Incorporated, Chicago.

"Modern Fracture Therapy" (Kodachrome Slides and Movies)—ROGER ANDERSON, M.D., Seattle, Washington.

Saturday, October 14

H. D. JUNKIN, M.D., Chairman:
"Hip Fractures"—H. W. WELLMERLING, M.D., Sloan Clinic, Bloomington, Illinois.
Discussion—F. W. SLOBE, M.D., Chicago.
"Fracture Surgery"—CHARLES P. BLAIR, M.D., Monmouth, Illinois.
"Tuberculosis Knee"—PAUL E. HALEY, M.D., South Bend, Indiana.
Round Table Discussion—CAPTAIN HARRY E. MOCK, JR., M.C., A.U.S.

H. W. WELLMERLING, M.D., Chairman:
"Clinical Review"—H. D. JUNKIN, M.D., Paris Clinic, Paris, Illinois.
"Teamwork in Fracture Therapy"—WILLIAM L. CULPEPPER, M.D., Illinois Central Hospital, Chicago.
"Pinning of Fractures"—IRVIN H. SCOTT, M.D., Sullivan, Indiana.
"Fracture Long Bones"—A. H. DIEHR, M.D., Department of Orthopedics, Missouri Baptist Hospital, St. Louis, Missouri.

LETTERS

The Scientific Exhibits

AS AN ADDED feature of the 1945 "War Conference" of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, which will meet in collaboration with the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, NATIONAL CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS and AMERICAN ASSOCIATION OF INDUSTRIAL NURSES at the Drake Hotel in Chicago, April 23 to 28 inclusive, 1945, it is contemplated that we will hold continuous showings of motion pictures on subjects such as health education, medical, surgical and nursing services in industry, etc., so that persons attending the meetings may become apprised of what films are available for showing to their own groups, management and employees We intend to show these pictures in a special section set aside in a special room along with the scientific exhibits.

—H. GLENN GARDNER, M.D., Chairman, Committee on Scientific Exhibits and Scientific Awards.

Du Pont Announces

NEW WATER-RESISTING HAND PROTECTIVE CREAM

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INDUSTRIAL HEALTH and DISEASE

Employee Physical Examinations

—Report of the A.M.A. Council on Industrial Health—

THE following report of the Council on Industrial Health is approved by the Board of Trustees:

The attached report has been approved by the Council on Industrial Health after consultation with representatives from the American Federation of Labor, the Congress of Industrial Organizations, the National Association of Manufacturers, the United States Chamber of Commerce and the Joint Claims Committee of the Stock and Mutual Casualty Insurance Companies. Because of the current importance of placing the disabled in suitable employment, each of the listed conferees is asking for ratification of this report by the respective parent organization. The Council on Industrial Health, therefore, requests approval of this report by the Board of Trustees and the House of Delegates.

—C. M. PETERSON, M.D., Secretary.

THE purpose of industrial health programs is to promote and maintain the physical and mental welfare of all industrial employees. Health examinations in industry are a means to this end.

Unjust or questionable exclusion from work through improper application of the findings on health examinations in industry is against the public welfare and contrary to sound industrial health principles.

From the public and industrial health standpoint, the only absolute bars to immediate employment in nonhazardous occupations should be:

1. Communicable disease.
2. Mental illness in which impaired judgment or actions prevent cooperative effort.
3. Incapacitating injury or disease.

Other considerations related to employer liability, workmen's compensation, factory acts and health codes must be determined separately for each jurisdiction.

Specifically, the objectives of industrial health examinations are:

1. To facilitate placement and advancement of workers in accordance with individual physical and mental fitness.
2. To acquaint the worker with his physical status and to assist him in improving and maintaining personal good health.
3. To safeguard the health and safety of others.
4. To discover and control the effects of unhealthful exposure.
5. To promote cooperative support and understanding of industrial health practices by employer and employee alike.

From *J.A.M.A.*, June 24, 1944.

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Scope

INDUSTRIAL health examinations should include:

1. Past medical family and occupational history.
2. Physical findings.
3. Personality appraisal.
4. Laboratory data.
5. Summary and recommendations.

General Procedures

SINCE placement of the worker in suitable employment is an important objective of industrial health examinations, the examiner will obtain best results only when he is familiar with the industry he serves. Medical inspection of the plant or industrial premises at regular intervals is essential to an adequate health examination program as well as in other aspects of industrial hygiene.

Health examinations in industry are classified under two major headings:

1. Pre-placement examinations of prospective employees.
2. Periodic examinations (regular or special).

In either case the examinations should be complete.

The examination should be conducted by the physician himself, except such routine procedure as can safely be assigned to trained assistants. The worker should remove all clothing in a private room. Special arrangements and a nurse or female aide in attendance are necessary in examining women.

Equipment

HEALTH examinations will be facilitated if the following equipment is available:

Examining table	Luer syringes (2 cc. and 10 cc.)
Stools, chairs and couch	Thermometer
Mirror	Dynamometer
Screen	Centrifuge
Scale and measuring rod	Microscope
Metal measuring tape	Stethoscope
Spotlight	Ophthalmoscope
Distant and near reading cards	Blood vacuum tubes
Color sense testing cards	Otoscope
Nose and throat mirror	Reflex hammer
Transilluminator	Rubber gloves and finger cots
Blood pressure instrument	Tuning forks
	Hemoglobin outfit
	Urinalysis equipment
	Garment racks
	Standard office furniture

Records

CONTENT—No single form has been devised to suit all requirements. The accompanying example is a composite of many used successfully in industry.

Regardless of form, the records should contain:

1. Identification data: name, address, date and place of birth, race, sex, marital status, clock or social security number. Some industrial physicians include name and address of next of kin.

2. Past medical and occupational history: Although details may be elicited by assistants, the importance of significant past health experience should be evaluated by the physician himself.

3. Physical findings:

(a) Pre-placement examination. The attached form is designed for pre-placement health examinations. Clarity and uniformity of expression are desirable. Variation in procedure will depend on specific industrial exposures and special job requirements. Examinations for transfer to other work or on return to work after prolonged absences are essentially pre-placement in character.

(b) Periodic examination. Re-examination should be conducted in the same detail as the original pre-placement examination survey. The recommended form can be readily modified to allow for re-examination and to

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West Durma-Gard Protective Aprons, Arm Guards, Coveralls and Overalls are made of a light, strong base fabric treated on both sides with especially processed plastic which definitely resists absorption, penetration or saturation of solvents, oils, acids and other materials commonly used in industry. They afford workers an exceptionally high degree of protection against the irritants and most injurious chemicals, dust, vapors, etc., that cause industrial dermatitis.

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1. Resistant to oils, acids and chemicals. **2.** Resistant to dusts and powders. **3.** Resist absorption. **4.** Withstand solvents. **5.** Light in weight — comfortable. **6.** Adjustable Arm Guard Sleeves for ventilation (fit any wrist). **7.** Washable in soap and water.

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meet special requirements. General principles are fully described in "Periodic Health Examination—A Manual for Physicians," American Medical Association, Chicago, 1940. Repetition of health examinations must be determined by the physician in charge, based on his original examination and the nature of the industrial environment.

4. Personality data. Observation of temperament, personality and significant nervous or mental manifestations should be correlated parts of a complete examination. The brief outline suggested in the form has been used in practice with good results.

5. Laboratory data. Urinalysis, hemoglobin determination, blood test for syphilis, chest x-ray examination, differential blood smear and blood sedimentation rate are employed in industry in about that descending order of frequency.

6. Summary and recommendations.

Rating.—Usage varies in rating health status, but the common intent is to classify workers in one of the following groups:

A. Fit for all work.

B. Fit for work under periodic medical review:
   1. With limited physical exertion.
   2. In nonhazardous work.
   3. With orthopedic defect.
   4. With defective vision.
   5. With defective hearing.
   6. With neuromental handicap.

C. Unfit for work at time of examination.

Preservation and Use.—The examining physician may properly put information derived from records of industrial health examination to the following uses:

1. All major findings should be discussed with the worker, with emphasis on the importance of obtaining immediate and adequate medical care.

2. A transcript may be supplied to the employee's personal physician or to other official community health agencies on request or consent of the employee.

3. The employer should be given information in accordance with the rating plan described in this report to facilitate placement or promotion. A special simple form can be devised for this purpose.

The employer should especially be notified of any condition or disability thought to be caused by faulty work environment.

4. Governmental agencies such as courts, workmen's compensation commissions or health authorities should be supplied with information on legally enforceable official order or when required by law.

In all other respects the confidential character of health examination records should be rigidly observed and access should be granted only on consent, in writing, of the worker, preferably after preliminary discussion with the examining physician.

Suitable filing equipment and training of personnel should be provided for the safe keeping and confidential maintenance of all medical records in the exclusive custody and control of the medical director.

INDUSTRIAL HEALTH EXAMINATION

Employer — City — State
Name — Address — Clock No.
Age — Race — Marital Status — Sex — Social Sec. No.
Personal Physician — Next of Kin

Personal and Family History:
Immunization Record:

Occupational History:

Physical Examination: Date — Examiner
Height — Weight — Chest Measurement { Inspiration / Expiration }

Temperature — Pulse { Resting / After Exercise } — Girth
Blood Pressure — Posture — Musculature — Nutrition
Skin — Glands — Hair — Scalp

Vision { Distant { Right / Left } — Corrected { Right / Left } ; Near { Right / Left } — Corrected { Right / Left } ; Color Sense — Depth Perception — Eyegrounds }
Hearing { Right / Left } — Nose-Throat — Tongue

Tonsils — Neck
Teeth — Gums

Lungs { Right / Left }
Heart
Abdomen — Hernia
Genitalia — Rectum — Prostate

Spine
Joints — Reflexes — Hands — Feet
Dysmenorrhea

Laboratory Data: Date — Examiner
Urine: Appearance — Specific Gravity — Sugar — Albumin — Sediment
Blood: Hemoglobin — Smear — Sedimentation Rate
Wassermann — Kahn — Kline
X-Ray: Chest — Other

Personality Data:
Appearance { Neat / Careless / Slovenly } — Temperament { Aggressive / Quiet / Cooperative / Noncooperative } — Intelligence { Quick / Average / Dull }

Comparative Schooling* { Advanced / Average / Retarded } — Summary { High / Medium / Low }

Summary and Recommendations: — Rating:

*Comparative schooling refers to the level of education attained in comparison with other children in the family.

Personnel

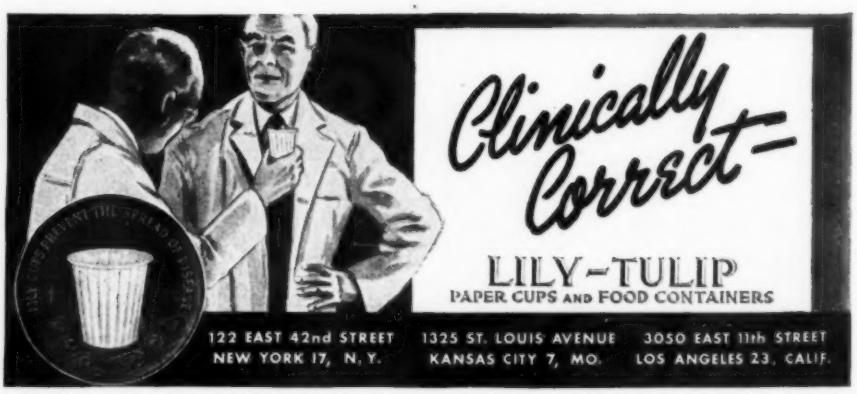
HEALTH examination is an important service of an industrial medical department having regular medical staff supervision. Where considerable numbers of examinations occur, nurses, technicians and clerks are helpful in securing and recording data in routine procedure. They require training, which should be a special responsibility of the medical director.

In small plants, employers customarily make arrangements with individual examiners.

A modification of this practice is to secure the services of an examiner from a panel of physicians approved by the county medical society for services of this kind.

Costs

INDUSTRY should furnish, without charge, all medical and clinical assistance essential to a health examination program.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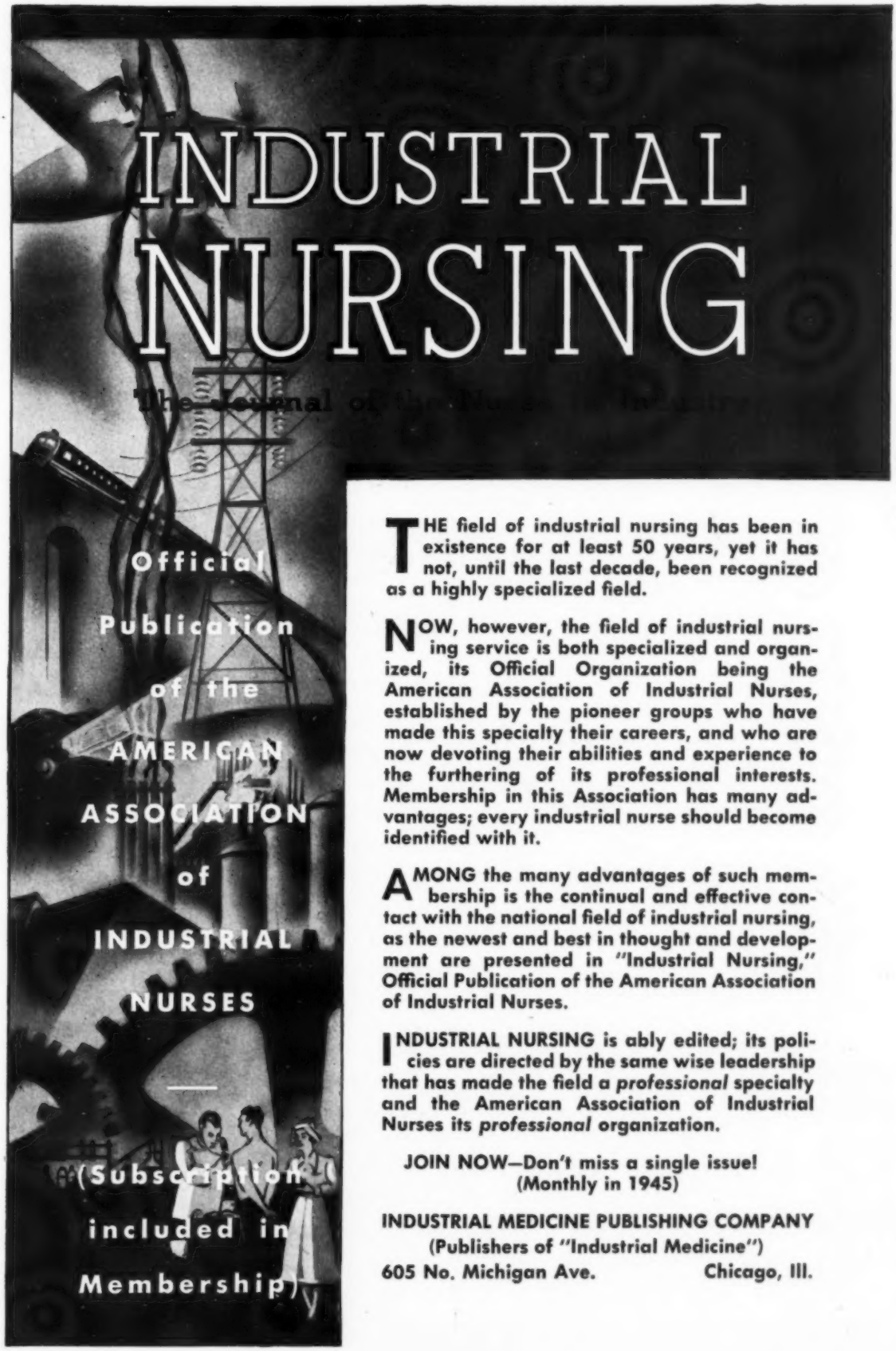

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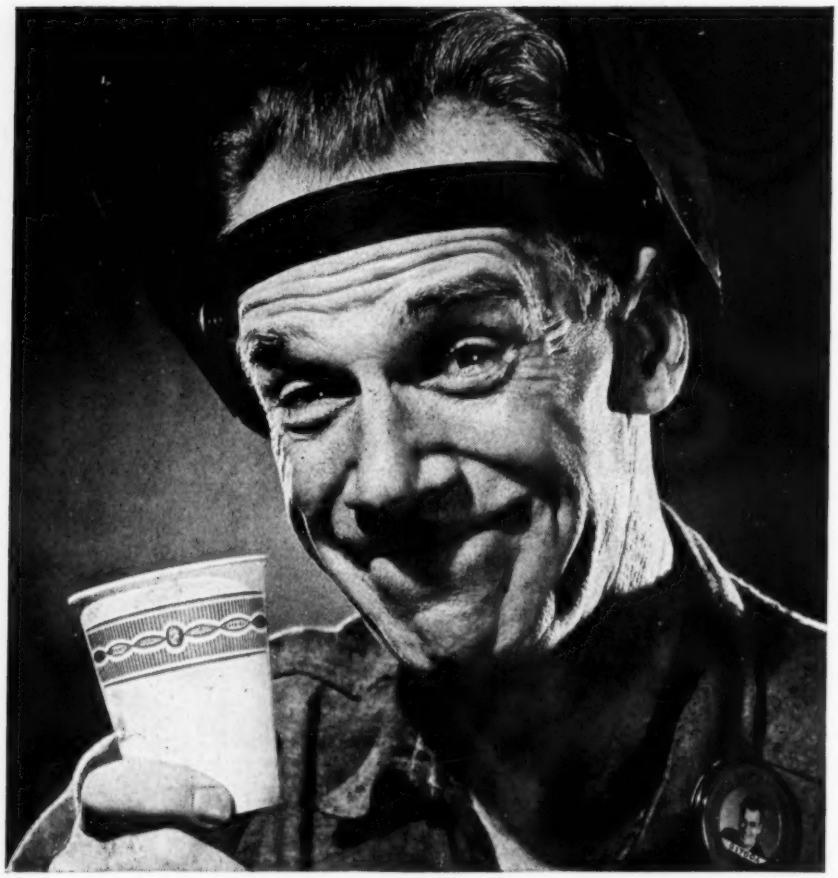

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DR. PILGRIM

THE season of the American Public Health Association meeting in New York drawing near did bring bright new the wish that the days thereof would not so fall—as seems their yearly wont—within the week of the National Safety Congress in Chicago. Wherefore was the choice between the industrial medical sessions of the one and of the other, because of which I had me to the East—beset with hope that what I journeyed far to listen to would not have less of reward for the effort of going than what I might have heard by staying home. For home were easier stayed by, what with travel, whereof the thought of "easier" touched off one of those adventures in relations of words and associations of ideas which might be called psychosemantic, the same coming to end with resort to the unabridged wherein to verify the faint remembrance of an erstwhile meaning—heard and long forgotten—of the term "malingerer." It is written there: "malingerer—a soldier or sailor who feigns himself sick, or who induces or protracts an illness, in order to avoid doing his duty." Whenceforth came back the story of the Army man at a southern hospital who—with a case of "gang-plank fever"—had been in the ward "psychiatric" yclept, with others of his ilk who feigned wild ills to come by their discharge and did queer things in symptom of the same. The Major (MC) who was head of the ward looked up from his desk one morning to see the "malingerer" crawling into his office on hands and knees. He watched him paddle near, stop, look up, and say: "Woof! Woof!" Whereupon the Major heaved himself from his chair, got down on all fours, went close and answered him: "Woof, woof, yourself! Now get the hell outa here!" The astonished soldier stood up and walked away, and the Major returned to the dignity of his desk. Wherein may lurk a subtle

—Continued on page 892.

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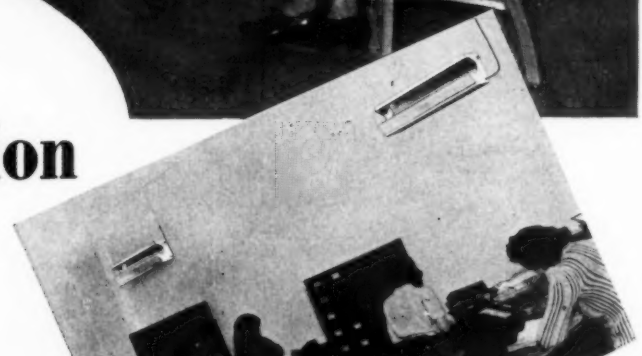

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This Industrial Hygiene Section is published to promote sound thought upon and concerning industrial hygiene. To that end it will contain articles, discussions, news items, reports, digests, and other presentations, together with editorial comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

The Editorial Committee will exercise its best judgment in selecting for publication the material which presents most exactly the factors affecting industrial health and developments for control of potentially injurious exposures. The editors may not concur in opinions expressed by the authors but will endeavor to assure authenticity of fact.

The Science, the Law and the Economics of Industrial Health

Volume 5 | October, 1944 | Section 4

The Industrial Hygienist

—In the War Effort—

TNT spells disaster to the enemy but it can also spell trouble at home, in the production of the huge quantities necessary for modern warfare. In the last war much TNT was produced, and many of those engaged in its preparation were knocked out through being poisoned by TNT vapors and fumes. In the present war the tonnages of this substance are tremendously greater. The methods followed in its manufacture and handling are not radically different from those utilized in 1917 and '18, but, under present operating conditions, a new influence has been injected into this wartime industry, and, rather than a proportionately increased number of cases of TNT poisoning—as might normally be expected with attendant interruptions in production and difficulties with labor supply even under the stimulation of patriotic appeal—the facts are that cases of systemic TNT poisoning are almost nil.

How was this accomplished? What is this new influence which has markedly assisted in bringing about this most desirable but often difficultly obtainable achievement?

In TNT production and throughout the whole gamut of industry essential to the war effort, the industrial hygienist has been effectively engaged in determining those unit operations which may be causing exposures injurious to health and showing the way for control of such hazardous operations.

Freedom from injurious effects of the increasing number and variety of potentially injurious materials does not just happen; it must be accomplished through the application of the scientific methods which the industrial hygienist has developed and adopted over the last score of years.

During the more recent period, when production has been so important and trained labor so scarce, the work of the industrial hygienist has gone even farther as a contribution to the war effort than prevention of occupational diseases themselves. The presence of a condition in an industrial plant producing critical material of hazardous conditions which may send one or two workers to the hospital causes great apprehension among the remainder of the workers. Through the control of such hazardous conditions, hysteria among the workers is relieved—not only because the operations are causing no demonstrable injury but also because the workers feel more secure when they know that an experienced industrial hygienist is keeping in constant contact with potential health hazards so that they can be corrected, if necessary, before actual injury to health occurs.

Over the past decade, there has been a great expansion in the personnel and services of State Industrial Hygiene Divisions and in the Division of Industrial Hygiene of the U. S. Public Health Service. And during the war years, the Occupational Hygiene Branch of the U. S. War Department, Office of the Surgeon General, the Safety and Security Branch of the Office of the Chief of Ordnance, the larger yards of the U. S. Navy, and the U. S. Maritime Commission have all organized effective industrial hygiene programs to take care of conditions coming within their immediate jurisdictions. And the industrial hygiene divisions of a number of the leading insurance companies have extended their activities in occupational disease control in plants under their coverages.

A most encouraging development on the general front is the increasing introduction of industrial hygiene personnel, with field and laboratory equipment, among the industrial concerns of the country which, because of their size, have a variety of occupational disease exposures or, because of their type of activity, have some specialized industrial hygiene problem.

Recognition of the industrial hygienist throughout all the elements concerned with effective production, with an increasing emphasis on the necessity of controlling potential health hazards, speaks volumes on the values of results obtained. On the basis of the record of achievement for the war effort, the industrial hygienist can carry on with a new assurance that he is undertaking a work which not only he himself knows to be worth while but which management, medicine, labor, public health and all the elements making up the country's industrial and social organization have also recognized as being of such real value that they are counting on its continuance and progressive enhancement postwar. The industrial hygienist has demonstrated that he has served the country well in the war; he will do as well in peace.

INDUSTRIAL MEDICINE, Industrial Hygiene Section: Official Publication of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, J. J. BLOOMFIELD, President; ROBERT A. KEHOE, President-Elect; EDGAR C. BARNES, Secretary; J. B. LITTLEFIELD, Treasurer: Published in January, April, July, and October: Editor, WARREN A. COOK: 605 North Michigan Avenue, Chicago.

Soldering Operations

—Evaluation of Health Hazards in the Various Types of Soldering Operations, and Illustration of Practical Means of Control—

G. WALKER DAUBENSPECK, ARVID TIENSON, and ALFRED M. NOYES,
Industrial Hygiene Division,
Illinois Department of Labor

ALTHOUGH soldering is one of the oldest industrial operations in use today, little can be learned about its associated health hazards in the industrial hygiene literature. This is reflected in the common disregard of the inherent hazards in soldering operations.

In order to fill this gap in the available information, the Industrial Hygiene Division began, three years ago, a survey of conditions at a variety of operations. Throughout this study the continuing conversion to war production and special war needs has emphasized the need for a better knowledge of methods for controlling the health hazards because of:

1. The tremendous increase in the volume of soldering operations;
2. Introduction of soldering into new industries;
3. Increased lead content of solders as a tin conserving measure, and other changes in composition of solders; and
4. Changes in soldering technique.

Definition

TO BEGIN with, the term soldering, as used in this paper, will apply to the joining of metal parts by means of a readily fusible alloy where the working temperature is well below the melting point of the parts to be joined. Also for this purpose, soldering will include "tinning"—the coating of metal by dipping into a bath of molten lead alloy. Related operations, such as brazing which merges into higher temperature hard soldering, and lead burning which is similar to some types of flame soldering, will not be included.

TABLE I.
COMPOSITION OF REPRESENTATIVE SOLDERS

Soft Solders

Sn	Pb	Sb	Cd	Bi	Zn	Others	Melting Point °F.
63	37	....	....	....	....	....	361
50	50	....	....	....	....	....	421
40	60	....	....	....	....	....	460
33	67	....	....	....	....	....	485
15	85	....	....	....	....	....	545
38	60	2	....	....	....	....	442
49.25	50	0.75	....	....	....	....	406
50	25	....	25	....	....	....	320
66	27.5	....	6.5	....	....	....	342
50	32	....	18	....	....	....	295
50	25	....	....	25	....	....	266
20	40	....	....	40	....	....	235
37.5	....	....	12.5	50	....	....	151
30	....	....	50	....	20	....	531
50	....	25	25	....	....	....	592
50	25	....	....	....	25	....	637
37.3	62.7	....	....	....	....	.1 As	464

Tin Conserving Solders

5	95	....	....	....	....	....	595
4	90	6	....	....	....	....	529
15	75	....	10	....	....	....	471
10	85	....	5	....	....	....	500
....	97.5	....	....	....	....	2.5 Ag	579
2	86	....	12	....	....	....	500
13	27	....	10	50	....	....	158
....	53.8	....	15.4	30.8	....	....	176
....	80	....	20	....	....	....	498
....	70	....	30	....	....	....	500
....	90	....	10	....	....	....	525
....	87	13	....	....	....	....	477
....	95	....	....	....	....	5 Ag	689

Hard Solders

Ag	Cu	Zn	Cd	P	Sn	Others	Melting Point °F
50	34	16	....	....	....	....	690
50	16	16	18	....	....	....	627
30	38	32	....	....	....	....	745
15	80	....	....	5	....	....	640
63	30	7.5	....	....	....	....	.....
40	14	6	....	....	40	....	.....
....	....	75	20	....	....	5 Al	.....
80	13	6.8	....	....	....	....	.....
3	89	.25	.25	7	.25	.25 Co	.....

Presented at the Sixth Annual Meeting of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, St. Louis, May 11, 1944; available as Technical Paper No. 5, Illinois Department of Labor, Industrial Hygiene Unit.

Solders

SOLDERS are usually classified as "soft" and "hard" (see Table I) or "tin-lead" and "silver-copper alloys" respectively. The soft solders are worked at temperatures usually below 600°F, while hard solders generally require temperatures above 600°F.

The working temperature of most solders is always above their melting point. In the can industry the shift from solders of 30-40% lead content to the 98% lead-silver alloy has required an increase in the working temperature.[3] Fig. 1 illustrates the change in the melting point of solders as the lead content increases. Note that the melting point of 50% lead solder is only a little higher than that containing 30% lead. Although the lead-silver eutectic (97½% lead—2½% silver) melts at 580°F, in use these "98% lead" solders take up about 3% tin from the tin plate, and this reduces the melting point slightly. The higher working temperatures required by the new high-lead solders have necessitated changes in the heating technique, especially in the tin can industry.

From the standpoint of the health hazards the significance of the higher working temperatures is the much more rapid production of a surface of powdery oxide. However the increase in the vaporization of lead at higher working temperatures is practically negligible as shown by Fig. 2. It must be borne in mind that the ease with which the fine lead oxide dust can be dispersed into the air will increase the health hazard far out of proportion to the increase in lead content.

Fluxes

ONE of the less known factors in the hazards of soldering is the part played by the flux. The purpose of a flux is to remove the oxide or other film from the parts being joined and allow the molten solder to wet the surfaces completely. Muriatic acid, ammonium chloride (sal ammoniac), and other chloride salts are among the most common fluxes. Since lead chloride is much more volatile than lead or lead oxide, chloride-containing fluxes tend to increase the lead hazard.

Fig. 2 shows the increase in vapor pressure of lead and lead chloride with increased temperature. At about 950°F the vapor pressure of lead amounts to 1.5 milligrams per 10 cubic meters (the generally accepted limit for air-borne lead). This is above the ordinary range of soldering temperatures and is near the melting point of lead chloride. The corresponding vapor pressure of lead chloride at 950° F amounts to about 50,000 milligrams of lead per 10 cubic meters. This shows that while lead itself as a vapor or fume is not significant in the range of soldering temperatures (but may be in cases of local overheating such as in flame soldering), the vapor of lead chloride may be highly important. Dust is, of course, the main source of air contamination at all temperatures, but, at higher temperatures, oxidation to a fine dust is more rapid.

Rosin is the common flux used in soldering electrical equipment where chlorides must be avoided. Many exhaust systems have been put in primarily to control the irritating smoke arising from rosin flux.

When a flux is chosen the desired properties from a technical standpoint are: effecting a good bond between the parts, increasing production, and not favoring corrosion. From the health standpoint, the only common consideration in the choice of a flux has been a "guarantee" that it will not irritate the nose, throat or skin. However, the important properties of a flux from the standpoint of the lead hazard are (1) absence of chlorides, and (2) tendency not to produce a dry, powdery film of lead oxide.

To label a flux as "harmless" merely because it is non-irritating is misleading because this quality is no measure of the lead hazard.

Fluorides are among the most hazardous of the common flux constituents. They are rarely used in lead soldering but commonly in silver soldering.

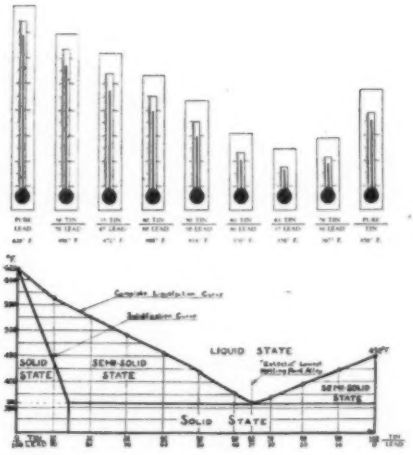


Fig. 1.

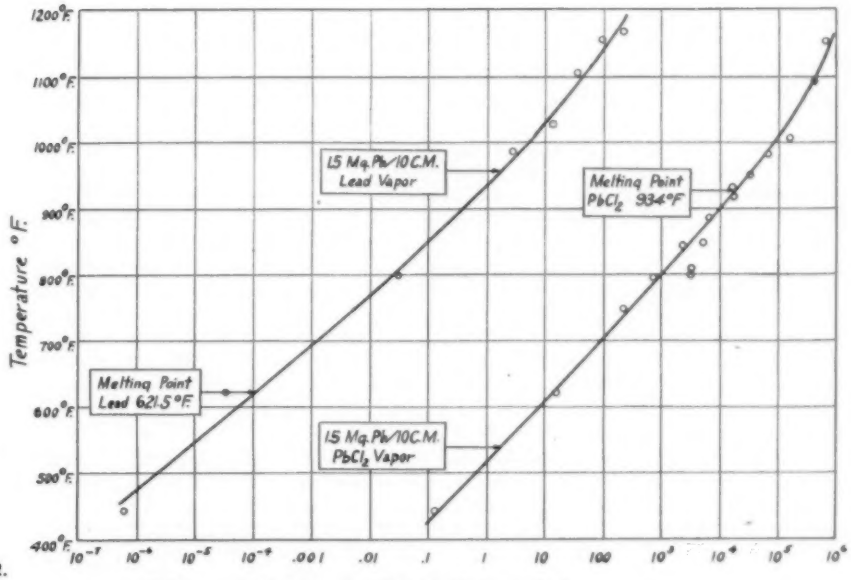


Fig. 2.

Solvents

SOLVENTS also affect the hazards of soldering operations. Carbon tetrachloride, xylol, alcohol and other solvents are sometimes used when a flux is to be applied in solution. War contracts usually specify the removal of flux residues by means of solvents. Some of the solvents used in this way have been mixtures of methanol and benzol. It is common to substitute non-flammable solvents to eliminate the fire hazard and at the same time not consider the increased health hazard. In one plant, because of a fire, the flammable solvent was replaced by trichlorethylene with no control of the vapors. Carbon tetrachloride, which is often specified for cleaning soldered joints, is one of the most dangerous non-flammable solvents. Complaints of nausea have been made where these chlorinated solvents have been used without control of the vapors. Fig. 14 shows how one plant is controlling the vapors from a solvent cleaning operation by local exhaust.

The Lead Hazard

THE chief point of attack in preventing harm from soldering operations is control of lead dust. Although adequate personal hygiene facilities and acquainting the workers with the hazards will go far toward preventing lead poisoning by ingestion, that is only part of the picture. The most important mode of entry of lead is by breathing, and the principal job of the industrial hygienist is to keep the lead out of the workroom air.

The first step in evaluating the hazard at soldering operations is to determine the lead concentration in the air. Fortunately, we have in this case a well established limit, and the degree of control is determined by the extent to which the lead concentration is kept below 1.5 milligrams per 10 cubic meters; that is, how large a factor of safety is being maintained. The results of this investigation show that it is no great engineering feat to achieve and maintain lead concentrations well below this limit.

In our survey we have determined the lead concentration in the air at 160 operations involving soldering in 84 plants, and from this survey we have learned what is necessary for adequate control. The majority of the samples were taken in selected environments where there was some question of the hazard. Some were taken to determine the effectiveness of different control methods, and others to find out how much the lead concentration could be reduced and how it could be kept at that low level.

In many environments it is not necessary to take air samples in order to decide that one or more conditions are not satisfactory. On the other hand, to be reasonably certain that control measures are being consistenly maintained, it is necessary to determine the lead content of the air throughout the cycle of operation after good control has been established. Harmful quantities of lead, which would not be suspected from visual observation, may be present in the air but would be revealed only by air samples.

Hand Soldering—Soft Solders

ON THE BASIS of the hazards and methods for their control, hand soldering operations may be divided into four types: gas-heated irons, electric irons, tinning, and torch soldering. Table II gives a summary of lead findings on air samples taken at soldering operations. Note the third vertical column in Table II, which lists the number of samples found under 0.3 milligram, that is, those having a factor of safety of five or more.

It should be emphasized that, in addition to the lead hazard, other hazards may be presented by hand soldering operations. For instance, when impregnated coils or condensers are soldered or tinned, poisoning and severe

TABLE II.

AIR CONTAMINATION BY LEAD-SOLDERING OPERATIONS
157 AIR SAMPLES FROM 82 PLANTS

TYPE OF OPERATIONS	NUMBER OF SAMPLES	MILLIGRAMS OF LEAD PER 10 CUBIC METERS OF AIR					
		UNDER 0.3	0.3 TO 0.7	0.7 TO 1.5	1.5 TO 2.5	2.5 TO 4	OVER 4
GAS HEATED IRONS	37	6	4	8	9	6	4
ELECTRIC IRONS	32	9	8	6	6	3	0
TORCH SOLDERING	21	9	4	1	2	1	4
TINNING LARGE SMALL POTS	39	8	11	5	6	3	6
MACHINE SOLDERING	28	1	3	5	3	5	11
TOTALS	157	33	30	25	26	18	25
		UNDER 1.5 88			OVER 1.5 69		

dermatitis may be caused by the volatilized chlorinated waxes.

GAS IRONS: In the oldest type of soldering the irons are heated by some fuel, usually gas. This method is still commonly used for heavy work, such as soldering of radiators, sheet metal ducts and ammunition cases. The muffle furnace used in heating the iron is usually the principal source of air contamination by lead. The flame, by playing on bits of solder which fall to the muffle floor, burns or vaporizes these droppings and blows the finely divided lead oxide into the surrounding air. Gordon C. Harrold[1] has shown how serious this condition can be, and that it is essential to provide a complete enclosure of the muffle and mechanical exhaust. These lead deposits in the muffle are often major sources of contamination even when soldering is not continuous. Removing this dross by any but vacuum methods is likely to cause enormous air contamination.

We have found the highest proportion of high lead concentrations where gas-heated irons are employed. This is due to the relatively large amounts of solder used, frequent overheating, use of chloride flux, and use of muffle furnaces. The 37 samples at operations with gas-heated irons showed lead concentrations from 0.09 to 4.79 milligrams, with a number near the limit of 1.5.

An example of good control of gas-heated irons is illustrated by a sample taken where six operators were soldering ammunition cases. This sample showed 0.2 milligrams of lead per 10 cubic meters of air. Very good exhaust was furnished through a six-inch slot at the back of the bench, providing 600 linear feet per minute into the opening. The muffles were located near the exhaust hood and an air velocity of 75 linear feet per minute was maintained at the far edge of the bench. Housekeeping was good, largely because the exhaust effectively carried away the fine dust thrown out by the muffle or scraped off the iron itself.

An example of poor control was found at another location of similar heavy soldering, where one operator was soldering automobile heaters, and the lead concentration in the air was 3.22 milligrams. The operation was hooded but the mechanical exhaust was inadequate and housekeeping was poor.

ELECTRIC IRONS: Electric irons are used in great numbers in the radio and electrical industries and other industries where much light soldering is done. These operations are often exhausted primarily to eliminate the fume arising from the flux, but fortunately these controls have also reduced the lead exposure. Where large numbers of irons are used in the same area and where housekeeping is not good, the lead concentration is likely to be excessive.

In order to reduce this exposure some plants have provided a chimney or stack above the soldering operations, extending about two feet into the air. The idea is to draw part of the contaminant away from the operator and discharge it into the workroom where it would be diluted with the general air. Six of the 32 samples were taken at operations with such an arrangement. They indicate that the use of the chimney has no effect on the lead exposure.

Another makeshift practice is to provide a small fan which blows the air across the work and away from the operator. Three of the "electric iron" air samples were taken where fans were used in this way. All three were above the limit. A fan used in this way is definitely bad, since it increases the lead exposure by stirring up any fine dust. Cooling fans may be desirable, but the air current should be shielded so as not to blow across the operation or past the opening of an exhaust hood.

The 32 samples taken at electric iron soldering operations ranged from 0.14 to 3.69 milligrams of lead per 10 cubic meters of air with the majority near the lower side. Two of these examples are selected to illustrate good and poor control.

An air sample taken at an operation having exhaust similar to that shown in Fig. 7 and very good housekeeping, showed 0.14 milligrams of lead per 10 cubic meters of air. Thirty-five people were working in the area, soldering condenser plates with 100-watt irons. A sample taken immediately afterward with the exhaust off showed 0.34 milligrams. This substantial increase can be attributed only to the turning off of the exhaust. The effect of the housekeeping would be shown at a later time because the fine dust, which had previously been removed by the exhaust, would now accumulate and add to the exposure. In other words, exhaust aids in good housekeeping.

Another air sample, where two men were using 150-watt irons in soldering armatures, showed 3.38 milligrams of lead per 10 cubic meters of air. The irons were clean but there was some powdery dross on the bench.

An attempt at exhaust by means of a high canopy was quite ineffective.

CLEANING SOLDERING IRONS: After continued use, irons become coated with a layer of metallic oxides and this coating must be removed periodically to furnish a clean surface of copper for tinning. Cleaning of irons may disperse more lead into the air than the soldering operations themselves. Whether each solderer cleans his own iron or the job is done in one location by a man assigned to that job, the filings or dust must be controlled. At a filing operation we found 0.4 milligrams of lead per 10 cubic meters of air; the necessary control here is the trapping and the disposal of the filings in such a way that they will not be ground under foot and dispersed into the air as a dust. At an uncontrolled scratch brushing, grinding and tinning operation on solder irons we found 17.3 milligrams of lead per 10 cubic meters of air. Enclosure and adequate local exhaust were ordered for the control of this serious exposure.

TINNING: In tinning or dipping operations, the hazard arises largely from lead oxide which forms on the metal surface or edges of the pots. This may be carried into the air by the work or dispersed by improper handling of the dross. The larger operations are more hazardous and more difficult to control, but we have found examples of good and poor control in both types.

For example, in one plant, milking machine parts were being dipped in a large pot enclosed in a booth; the actual tinning surface was one foot by two feet. The air velocity into the face opening was 100 linear feet per minute. Since waxy fluxes tend to prevent the formation of powdery dross, the use of this type of flux probably accounts for the very small amount of powdery dross at this operation. An air sample showed 0.11 milligram of lead per 10 cubic meters of air.

In another plant, two three-inch electrically heated pots were used for tinning wire tips. There was powdery dross on the surface and skimmings wre dumped on the table top. An air sample showed 3.95 milligrams of lead per 10 cubic meters of air.

Thirty-nine samples taken at tinning operations ranged from 0.05 to 11.75 milligrams of lead per 10 cubic meters of air. About half of these were at pots or baths five inches or more in one dimension. Note, in Table II, that both large and small operations are distributed throughout the range.

TORCH SOLDERING: In torch or flame soldering, the degree of hazard depends on the size and temperature of the flame, the position of the flame relative to the solder, and, of course, the housekeeping.

One of our samples was taken where the medium size acetylene flame used for solder-sweating of fairly large ordnance parts played on the solder surface about half of the time. The exhaust provided an air velocity of about 200 linear feet per minute past the flame and 1000 linear feet per minute into the duct about four inches away. There was no visible dross and the air sample showed 0.05 milligram of lead per 10 cubic meters of air.

Another sample was taken where copper floats were being soldered and no exhaust was provided. The work traveled past a fixed gas flame of moderate size. The flame played on the soldered surface much of the time. Housekeeping was only fair and, although there was no visible powdery dross in the immediate vicinity, an air sample showed 4.93 milligrams of lead per 10 cubic meters. This is evidently due to the flame playing directly on the solder surface as in lead burning.

Twenty-one torch soldering samples varied between 0.05 and 12 milligrams, with the majority near the two extremes. The reason for this spread is that most of the samples were taken in one plant with very great variation in the housekeeping.

"Silver Soldering"—Hard Solders

"SILVER SOLDERING" operations are being used increasingly in modern industry. Lead is not a factor in these operations but other hazards, at least as great, are presented. The principal hazards are the fluorides present in most of the fluxes and the cadmium which is generally present and may constitute as much as 20% of the solder. Fluorides are most likely responsible for the complaints of nasal irritation, and our observation of scabs on the nasal septum. Since both fluorides and cadmium are among the most dangerous industrial poisons, safe practice requires that "silver soldering" operations be provided with adequate local exhaust. The methods later illustrated for control of lead soldering operations are applicable to silver soldering operations as well.

TABLE III.
CADMIUM IN AIR SAMPLES

Operation	Mg. Cd per 10 c.m.	% Cd in Solder	Enclosure	Exhaust	Housekeeping
Sweating-furnace.....	0.035	11	Fair	Poor	Fair
Sweating-furnace.....	0.059	11	Fair	Poor	Fair
Sweating-furnace.....	0.130	11	Fair	Poor	Fair
Sweating-furnace.....	0.182	11	Fair	Poor	Fair
Torch soldering.....	0.332	11	None	None	Poor
Torch soldering.....	0.568	11	None	None	Poor

Table III shows the findings on cadmium in a few air samples taken at two types of "silver soldering" operations. In all these cases the cadmium is below the limit of 1.0 milligram per 10 cubic meters of air. Note that it is not much below this limit at the flame soldering operations. In all six of these operations, we are dealing with a combined hazard and the fluorides, which were immediately detectable by irritation of the nose, are also an important factor in the toxicity of the "fume." These partial data are presented to indicate that cadmium can be at least a potential hazard and that both cadmium and fluorides must be considered in "silver soldering" exposures.

Effect of Housekeeping and Exhaust

GOOD housekeeping and properly designed local exhaust are the most important measures for controlling the lead hazard at soldering operations. Table IV shows the results of a number of air samples taken in one plant.

TABLE IV.
INFLUENCE OF HOUSEKEEPING ON AIR-BORNE LEAD IN ONE PLANT

Survey Number	Agency	Number of Air Samples	Average Milligrams of Lead per 10 Cubic Meters of Air	Housekeeping
1	I	1	12.0	Poor
2	P	2	0.4	?
3	I	3	5.2	Poor
4	Both	6	0.1	Very good

Light metal articles were being joined by torch soldering. The flame was small and actually played on the solder only a minor part of the time. No enclosure or exhaust was provided for the operation. During Survey 1 an air sample taken by the Industrial Hygiene Division of the Illinois Department of Labor showed 12 milligrams of lead per 10 cubic meters of air. Housekeeping was poor, and an order was issued for improvement in housekeeping and provision of an enclosure and local exhaust.

In the meantime, a private agency had taken two air samples at this operation and found the lead concentration in the air to be low. This Division then collected three additional samples and again found high concentrations of lead. At the time of Survey 3 the housekeeping was poor. In view of the discrepancies, the two agencies visited the plant together and collected three pairs of simultaneous air samples. At the time of Survey 4, the housekeeping was very good and all the findings were quite low.

This illustrates the importance of good housekeeping and also the practical difficulty of consistently maintaining good housekeeping unless local exhaust is provided. It also shows how much the air contamination can vary due

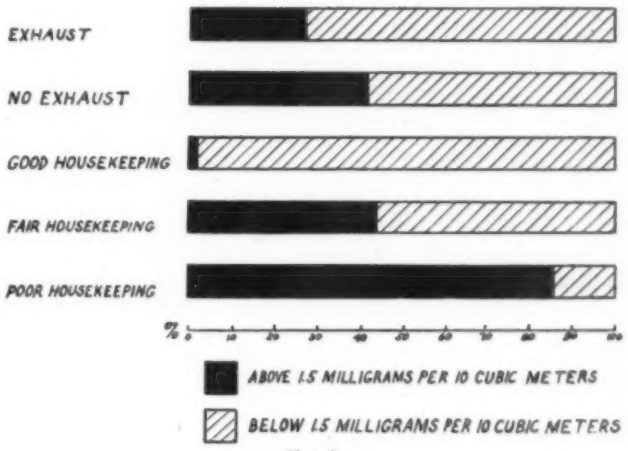


Fig. 3.

to apparently minor causes. Starting with a clean workbench but no exhaust, the air contamination may at first be relatively low. It is likely to increase sharply as small amounts of powdery oxides accumulate and are re-dispersed by air currents. With a good exhaust system and reasonable care in housekeeping a high factor of safety in air contamination will not only be achieved but will also be maintained indefinitely.

Good housekeeping, with reference to a lead hazard, applies particularly to the powdery dross which may get into the air as fine, usually invisible, dust. Vacuum cleaning of floors and benches is important, and it is practically impossible to maintain good housekeeping throughout the work day unless good exhaust is provided.

The bar graphs (Figs. 3 and 4) are based on the 129 air samples taken at hand soldering operations. In the first two bars of Fig. 3 all the samples are divided only on the basis of exhaust or its absence. The proportion above 1.5 milligrams is much greater when no exhaust is used. "No exhaust" includes operations where the exhaust was quite ineffective. Each bar represents all the samples in the particular category and the solid part represents the proportion which are above 1.5 milligrams.

In the last three bars (Fig. 3) all the samples are classified on the basis of housekeeping. When good housekeeping is maintained, the air contamination is nearly always under 1.5, whereas with poor housekeeping it is almost as likely to be above that limit.

For Fig. 4 the 129 air samples were divided into six groups based on three variations in housekeeping combined with the presence or absence of exhaust. The top three bars include all the samples having exhaust and the bottom three those without exhaust. The influence of housekeeping is again shown by the progressive amount of black on each group of three bars. The bars may also be considered in pairs having the same kind of housekeeping—the first and fourth good, the second and fifth fair, and the third and last poor housekeeping. The most significant bar is the top one representing the samples with good housekeeping and exhaust. These represent all types of hand soldering. Note that none is above 1.5 milligrams. In fact, they range from 0.05 milligram to 0.61 milligram,

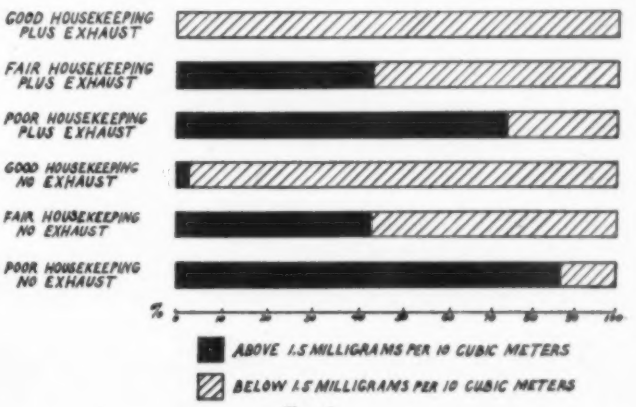
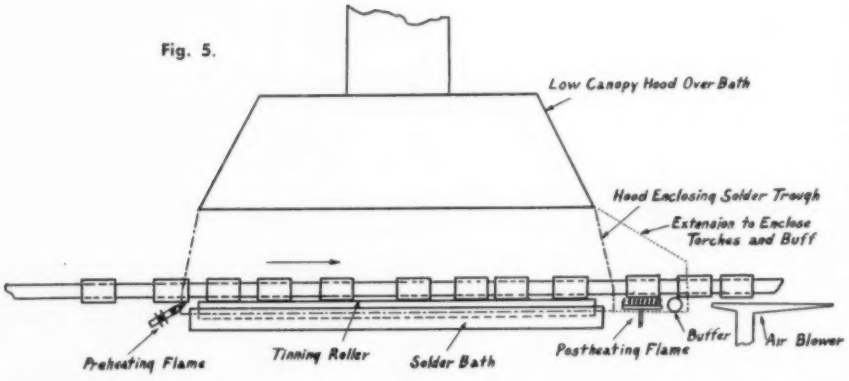

GOOD HOUSEKEEPING PLUS EXHAUST
FAIR HOUSEKEEPING PLUS EXHAUST
POOR HOUSEKEEPING PLUS EXHAUST
GOOD HOUSEKEEPING NO EXHAUST
FAIR HOUSEKEEPING NO EXHAUST
POOR HOUSEKEEPING NO EXHAUST
%
ABOVE 1.5 MILLIGRAMS PER 10 CUBIC METERS
BELOW 1.5 MILLIGRAMS PER 10 CUBIC METERS
Fig. 4.

Fig. 5.



the highest showing a factor of safety of nearly three, and the average being 0.24 milligram.

Of the 29 hand soldering samples taken at operations with exhaust, 13 had good housekeeping and six poor housekeeping. Of the 100 hand soldering samples taken at unexhausted operations, 38 had good housekeeping and 29 poor housekeeping. These figures show a definitely higher frequency of good housekeeping where exhaust is used, but this is not very pronounced (45% good housekeeping with exhaust and 38% good housekeeping without exhaust). It should be borne in mind that this is a selective group of samples and general observations point to a much greater improvement in housekeeping due to exhaust than this would indicate. On the other hand, there has at times been an apparent tendency to regard an exhaust system as a cure-all with consequent laxity in housekeeping.

Machine Soldering

MACHINE soldering is used where a large number of soldered parts are needed. The manufacture of floats and the fabrication of certain ordnance parts are special adaptations, but the can industry continues to be by far the most important application. From the industrial hygiene standpoint, machine soldering differs from hand soldering in that there is:

1. A larger surface of molten metal exposed to oxidation.
2. Continuous agitation of the surface.
3. A larger and more continuous volume of work.
4. The use of a gas torch or torches to preheat the work or to post-heat the soldered seam.

The can body seam machine, or body builder, is the most important soldering machine (Fig. 5). Strips of tin plate of the proper size are stacked in a pile at the entering end. These are removed one at a time from the bottom of the pile, bent into a cylinder and the seam formed and rolled flat by interlocking the edges. Flux is applied to the seam by a wiper and the seam may be preheated. The can body is then carried over a long solder bath and a metal roll the length of this bath wipes the outer part of the seam with solder. Beyond the bath there may be a post-heating gas torch or torches which play on the soldered surface as it passes rapidly along. This surface is wiped by a rotary cloth buff, and the partially fabricated cans pass over a blast of air for cooling the solder before they are dropped into the conveyor to the next operation.

The post-heating torch and the wipe after the cans leave the bath are important sources of toxic lead dust, and the exhaust hood, to be effective, must enclose both. If the cooling air blast is too near the wiper it will interfere with the exhaust. Some samples were taken at a location with rather low, exhausted canopies which usually covered only the solder bath. Other samples were taken where the sides and ends of the canopies had been dropped to form an enclosing hood. In too many cases the post-heating torch and buffer were not enclosed.

Most of the body builders are similar to the above description, but there are special modifications for oblong cans, on some of which the handle and spout are soldered to the body. The ends are ordinarily rolled into place with a thin rubber gasket, but in the case of milk cans the ends are soldered on. Ths is done on a machine called a floater, with a long lead bath similar to that on the body builder. Control of the lead hazard at the floater is similar to that at the body builder, but added control is necessary where the rough solder is buffed off the ends. Most of this knocked-off solder is, of course, in the form of heavy metallic granules, but the rapidly revolving brushes also disperse a large amount of very fine metallic dust. While an attempt is usually made to enclose these buffers, as a rule either no exhaust or inadequate exhaust is provided. The accumulation of solder granules must be removed and handled with great care to prevent dispersion of fine metallic dust. The Wisconsin State Board of Health reported a thorough study of the lead hazards in the milk can industry about a year ago.[2] In general, our findings, as represented by Plant B in Table V, agree with those reported in the above study.

The flux used for soldering cans gives rise to much visible smoke which is irritating, and that is why in the older system of exhaust the hood was designed to cover only the bath. The seam flux is a solution of rosin in alcohol and a layer of chlorides is used as a flux on the bath. Now it is fairly well recognized that the torch used in post-heating is an important source of air-borne lead and that good housekeeping is most essential. The high lead, tin conserving solders have greatly increased the hazard.

Air Samples at Machine Soldering Operations

THE machine soldering samples listed in Table II were all taken in the tin can industry. These 28 samples showed air contamination ranging from 0.19 to 48.5 milligrams of lead per 10 cubic meters of air. The general range of the samples is high. Five of the 11 highest showed air contamination by lead higher than any taken at hand soldering operations.

TABLE V.
CAN BODY SEAM MACHINES

Sample	Plant	Mg. Pb. 10 C.M.	Percentage Lead	Enclosure	Exhaust	Housekeeping
1	A	0.34	30	Poor	Fair	Good
2	A	1.43	50	Poor	Fair	Fair
3	A	2.13	70	Poor	Fair	Fair
4	A	23.8	98	Poor	Fair	Fair
5	A	1.54	70	Fair	Fair	Fair
6	A	4.96	98	Fair	Fair	Fair
7	B	2.36	30	None	None	Fair
8	B	7.37	30	Good	Good	Very Poor
9	C	18.8	30	Poor	Poor	Very Poor

Table V shows the results of nine of these air samples taken at breathing zone level at body builders (seam machines), usually about three feet out from the exit end. These results illustrate the importance of housekeeping, enclosure and exhaust, and the significance of the percentage of lead in the solder. The percentage of lead is closely related to the melting point, and hence the amount of oxidation and powdery lead oxide formed.

The first four samples show a series of increasing lead content with control factors about the same. The first sample was taken several years earlier when 70% tin solders were commonly used. A moderately low canopy was provided over the solder bath, and there was enough exhaust to remove nearly all the visible smoke from the flux. Under favorable conditions this gave rather good control of the low lead solders. The second sample was taken later when there was a higher percentage of lead in the solder, which required only a slightly higher working temperature. The increased amount of lead in the air is not great considering that the housekeeping was only fair. Samples 3, 4, 5 and 6 were taken the same day. Nos. 3 and 4 show how ineffective the old type of control is with the higher lead content solders. Where samples 5 and 6 were taken, enclosure on the machines had been improving by dropping the sides of the canopy to form

a hood over the solder bath. This was only partially effective because it did not enclose the post-heating torches. Additional post-heating torches are required with the higher lead solders and these added flames playing directly on the solder surface are a very bad source of contamination, especially when drops of solder fall and oxidize on the burners.

TABLE VI.
CAN BODY SEAM MACHINES

Sample	Plant	Mg. Pb. 10 C.M.	Percentage Lead	Enclosure	Exhaust	Housekeeping
1	D	0.47	70	Fair	Good	Good
2	D	0.91	70	Poor	Good	Good
3	D	0.19	98	Good	Good	Good
4	D	0.75	98	Good	Good	Good
5	F	4.55	75	Poor	Fair	Poor
6	F	5.76	70	Poor	Fair	Poor
7	E	13.5	70	Poor	Poor	Very Poor
8	E	15.1	70	Poor	Poor	Very Poor
9	E	48.5	70	Poor	Poor	Very Poor

The other three samples show how bad conditions could be when poor control was applied even to the low lead pre-war solders. Samples 7 and 8 are especially interesting. When sample 7 was taken there was no exhaust and an order was issued for such control. On returning, when a good system had been completed and in operation for some time, it was found that the housekeeping had deteriorated and, as a result, the air contamination was worse than before.

Good control is better illustrated in Table VI. Sample 1 was taken at a machine with an enclosing hood over the bath but the torch was not enclosed. The amount of air exhausted was so great that any lead dispersed by the torch was fairly well controlled. Sample 2 was taken at a similar machine with a low canopy and the same large amount of exhaust. It was pointed out to the management that sample 2 was only slightly below the limit while sample 1 showed a factor of safety of three. On the basis of this evidence the management was convinced of the advisability of providing better enclosure of the torches on all machines.

Samples 3 and 4 were taken a few months later when these improvements had been instituted and the higher lead solder was in use. The two machines and the control measures were quite similar, with the hood extending over the torch, and sufficient exhaust to give a minimum of 200 linear feet per minute into all openings. Terne plate, not tin plate, was used in the machine where sample 4 was taken. The housekeeping was only fairly good in any of the four cases. Since that time vacuum cleaning of the floors has been instituted, and powdery drosses are being handled with greater care so that the exhaust system can effectively pick up any unavoidable spilling. With these improvements a low concentration of lead in the air, of the same order as sample 3, will be easy to maintain.

Samples 5 and 6 were taken at a plant using slot exhaust along the solder bath. There was a noticeable amount of powdery dross on the floor. The exhaust had little effect on the lead dispersed from the post-heating torch because the exhaust slot was set about a foot away from the torch. Although control by slot exhaust requires less air than a hood, in order to be effective the slot must be brought sufficiently close to all sources of contamination. However, cross currents of air in the room are more likely to interfere with a slot type of exhaust system than with the type using complete hood enclosures. Exhaust slots which may have given adequate control when lower lead solders were used may be totally inadequate when shifting to the high lead solders which tend to form more powdery dross.

Samples 7, 8 and 9, which show some of the highest lead concentrations in this series, were taken about three feet out from the entering, middle and exit ends respectively of the same machine. Although a low canopy hood removed most of the flux smoke, it was provided with so little exhaust that the air velocity could not be measured at the top edge of the bath where the powdery drosses tend to collect. The considerable amount of powdery dross which was spilled on the floor and tracked about was an important factor in the high lead concentrations found in these air samples.

Control Measures

FIG. 6 illustrates a type of hand soldering booth for controlling the lead hazard by a system of local exhaust which facilitates the maintenance of scrupulous housekeeping. This design embodies the features of installations observed in the field and may be adapted to most types of hand soldering operations. Where gas-heated irons are used it is essential that the muffle be located within the hood. Unless irons are cleaned inside this booth the cleaning operation must be provided with its own enclosure and exhaust. A metal pan set under a removable grille at the front of the booth catches the dross and drippings. When these accumulations are removed, the receptacle must be placed in the booth and the exhaust must be operating.

The air volume is based on 100 x HL cubic feet per minute. The velocity in the pipes should not exceed 2000 linear feet per minute for economy of operation. If L is over five feet the booth should be provided with two branch pipes. The type of control illustrated here is especially adaptable to moderately large parts such as milk cans, ammunition cases, etc., or for torch soldering. For many operations a quite different design may be more practical. The following photographs show the set-ups which have been proved effective in controlling the lead hazard at different types of soldering operations.

Fig. 7 shows the use of an electric iron with the exhaust hood quite close to the work. Visible smoke from the flux does not get into the breathing zone and the housekeeping is good. The speckled appearance of the bench top is due to the pattern in the linoleum. The air velocity was 3000 linear feet per minute into the four-inch duct. The velocity falls off very rapidly with increasing distance between the working position and the exhaust hood; in this case, six to eight inches away from the hood, where the work was being done, the velocity had dropped to 150-300 linear

Fig. 6.

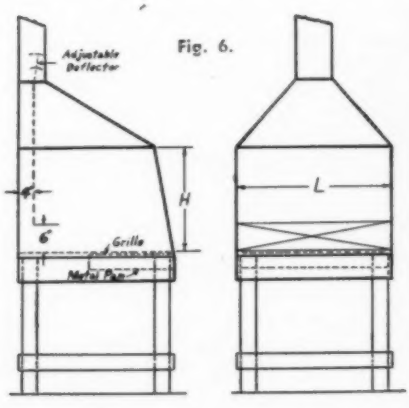


Fig. 7.
Hand soldering, electric iron, exhaust hood fairly near operation

Fig. 8.
Same operation as Fig. 7; note fume being drawn toward hood and main duct

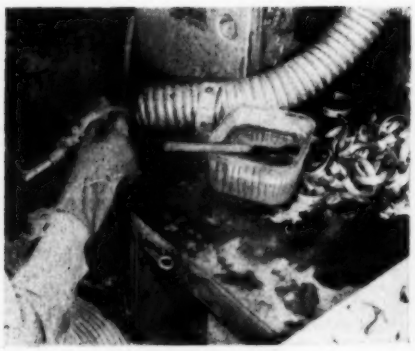


Fig. 9.
Electric resistance soldering, exhaust duct close to work

Fig. 10.
Exhaust ducts brought to several operations like one in Fig. 9

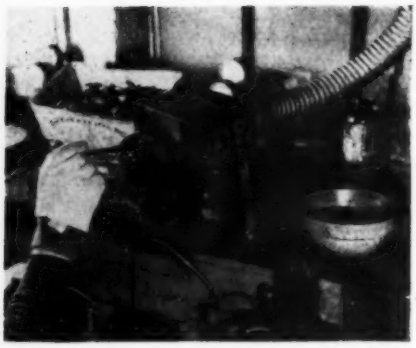


Fig. 11.
Torch soldering, movable exhaust hood

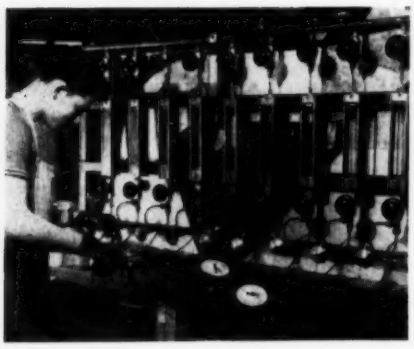


Fig. 12.
Electric soldering, gauges mounted in jig, slot exhaust

Fig. 13.
Torch soldering, fixed torches, parts on turntable, low canopy

Fig. 14.
Fixed electric iron, lamp shade serving both as light reflector and exhaust hood

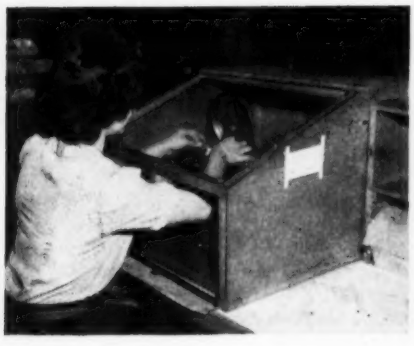


Fig. 15.
Exhaust booth for control of vapors in solvent cleaning of excess flux

Fig. 16.
Adjustable exhaust hood for tinning pot

Fig. 17.
Use of fixture and adjustable exhaust hood is more difficult type of control

feet per minute. An air sample taken at the breathing zone of the operator indicated 0.28 milligram of lead per 10 cubic meters of air.

All photographs reproduced in this paper were taken in war plants, but the fact that the work may be considered "temporary" has not prevented the managements from installing good control. Fig. 8 shows more of the duct work at the same location pictured in Fig. 7. The small hood on the end of the branch duct assists in directing the flow of air and helps to obtain an effective velocity of 150 linear feet per minute or more past the main point of origin of the lead dust.

Fig. 9 is a close-up of an electrical resistance soldering operation. In this case the 2½ inch duct can be brought very close to the operation and no expansion of the end is needed. Note the use of a rubber glove to prevent skin injury from the flux. The housekeeping is only fair, as shown by the dry spots and small quantities of visible dust. The sloppiness due to poor handling of the flux is not significant in the lead exposure. An air sample taken here, (same operation as performed by girl at the right in the back row Fig. 10) showed 0.19 milligram of lead per 10 cubic meters of air. The air samples taken at locations shown in these photographs were not included in the tables or bar graphs.

Fig. 10 is the same location as Fig. 9 showing the duct work reaching to several operations. By using flexible branch pipes it is possible to adjust the position of the opening for maximum efficiency in collecting the fumes. With so small a duct, it is very important that the opening be kept within effective range of the work.

Fig. 11 shows a torch soldering operation with the small fixed hood near the work which was clamped in a vise. Housekeeping was only fair but the waxy flux helped to keep the dust to a minimum. The air velocity was 700 linear feet per minute at the face of the hood and about 100 past the work. The high temperature of the flame accelerates the production of powdery oxides and unless this dust is carried away by exhaust it settles and becomes a source of recontamination. An air sample taken here showed 0.08 milligram of lead per 10 cubic meters of air.

In Fig. 12 an electric iron is being used with an exhaust slot at the back of the table. The housekeeping was good and was aided by the exhaust. The air velocity was 800 linear feet per minute at the slot and 200 at the work. The velocity in this type of exhaust is effective farther away because of the larger volume of air through the long slot and because the table top serves as a partial enclosure.

Fig. 13 shows a small flame soldering operation with the flame fixed and the work traveling on a conveyor. Housekeeping was good but not excellent. The sign warns against eating at the work place. Air velocity at the top edge of the canopy was 200 linear feet per minute and 150 at the work. Although in this type of exhaust hood the velocity falls off less rapidly than with the types previously illustrated, if the canopy were a little higher it would cease to be effective.

Fig. 14 shows a lamp shade used as a hood attached to a 2½ inch duct. The light inside the shade aids visibility. This is a good type of control for an iron in a fixed position. The air velocity was 1500 at the face of the opening and 250 to 300 linear feet per minute at the work.

Fig. 15 illustrates the use of a small hood for removing vapors in solvent cleaning of excess flux on soldered coils. The parts are allowed to dry in the enclosure and since the face opening is quite small an effective velocity can be maintained with a relatively small volume of air. The small opening is made feasible by a plastic window through which the operation can be observed.

Fig. 16 shows the use of a moderately large exhaust slot extending close to the edge of a small electrically heated tinning pot. This hood can be rotated in an arc or adjusted up or down. Note the wooden box into which the pot has been placed in order to faciilitate housekeeping.

Fig. 17 illustrates the use of an adjustable system of slot exhaust at a soldering assembly operation. With modifications in the work the flexible section permits lowering or raising and the duct swings in a four-foot radius. Note the holder for the iron on the edge of the bench. This holder catches dross falling from the iron when it is not in use, and promotes good housekeeping.

While this by no means includes all the possible methods of ventilating control of soldering operations, the illustrations have shown practical methods which can be adapted to most types of work. No matter which system is chosen, it must incorporate or be accompanied by scrupulous housekeeping—the trapping and disposal of dross.

Summary

IN ALL types of lead soldering, dangerous quantities of lead may be dispersed into the workroom air.

2. The principal sources of air-borne lead are locations where powdery drosses are formed, and these require careful control. Of greatest significance are: gas muffle furnaces, surfaces and edges of solder pots and baths, flames playing on a solder surface, any location where solder may spill and be burned to a powdery oxide, and the irons themselves.

3. High-lead solders multiply the hazard because of the more rapid oxidation of the lead at the higher working temperature.

4. Good housekeeping is essential. Cleaning must be done only by vacuum methods. What would be considered good housekeeping at most operations may be poor or fair when applied to soldering operations.

5. Air samples indicate that the only dependable type of control is a combination of scrupulous housekeeping and properly designed local exhaust. Several practical methods are illustrated.

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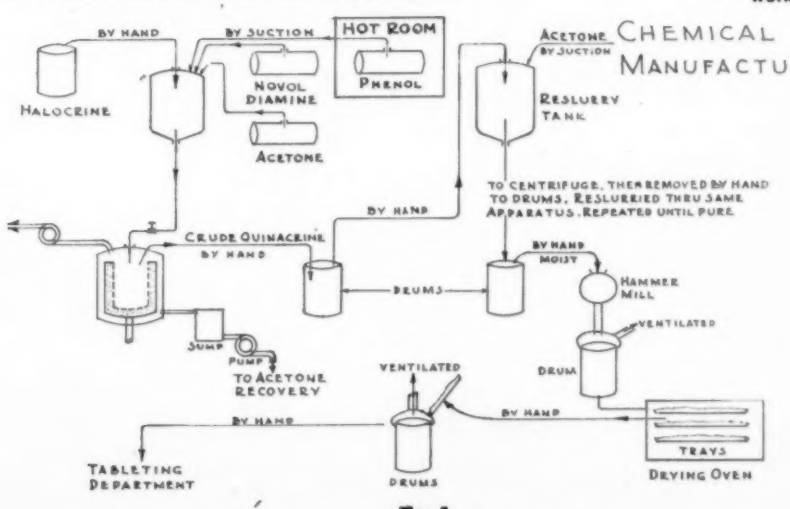

Fig. 1.
Flow sheet of chemical manufacturing operation

Quinacrine Dihydrochloride

—Occupational Disorders and Their Control—

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QUINACRINE dihydrochloride (atabrine) is a synthetic yellow dye of the acridine series, and has come into prominence lately only because of its extensive use as a substitute for quinine in the prophylaxis and treatment of malaria among our armed forces. Its irritating effects upon workmen who handle it in the manufacture of tablets would be of very limited interest under any other circumstances, but are described in this paper partly because they have never appeared in medical literature before and partly to illustrate how this particular industrial hazard was controlled by specially-designed machinery.

The Manufacturing Process

THE chemical synthesis of quinacrine involves a number of stages, and in some of these, toxic or irritating intermediate compounds must be handled. At Abbott Laboratories we were concerned only with the final step, in which halocrine is coupled with novol diamine in molten phenol. Following this, a series of recrystallizations is carried out to produce the purified quinacrine. These steps are illustrated in the accompanying flow-sheet (Fig. 1). An outstanding difficulty of this process is the large number of times the material must be manipulated by hand, but, since it is always in a moist condition until the final step of drying, the most troublesome hazard—a light, fluffy dust—is not encountered.

In making practically all machine-compressed tablets, it is necessary first to prepare the drugs in a

Fig. 2.
Full costume of workmen

granular form which will flow freely. This is most frequently done by moistening the mixture with an appropriate solvent, spreading it on trays to dry, and grinding the dried material to a coarse granular consistency. In the case of quinacrine, this procedure cannot be followed; instead, it is necessary to feed the powdered mixture of drug and excipients into a machine which forms it into large discs called "slugs." These are coarsely ground and fed to a second machine of the same type which re-forms the material into slugs. The coarse granulation produced by grinding these secondary slugs is suitable for use in tablet machines.

The ordinary slugging, grinding and tablet-compressing machines used in the pharmaceutical industry are designed to be fed by hand, and the escape of considerable amounts of dust is not ordinarily considered dangerous. It can readily be understood, therefore, that the performing of so many operations on a highly irritating and dusty material such as quinacrine would give rise to much illness unless special engineering precautions were adopted. An elaborate exhaust system was designed by the engineering department of Abbott Laboratories, and by its use the dust exposure was reduced to very low levels, as shown in Table I.

TABLE I.
QUINACRINE CONTENT OF TABLET-ROOM AIR*

Sampling Point and Conditions	Micrograms per Liter
Floor level. All machines operating. Dryers being emptied in adjacent room	0.35
Platform beside rotary mixer during filling	4.2
Platform of slugger No. 1. Operator's station	2.1
Floor level. All machines operating. Contents of portable hopper dropped in tablet machine	1.8
Same as previous sample	1.8

*Though many more accurate and refined methods of determining quinacrine have been developed, the following rough method was found adequate for the air analyses:

Air was passed through 10 cc. of distilled water in a midget impinger of the M.S.A. type. One cubic foot of air usually contained enough quinacrine to impart a faint yellow color to the water, which was transferred directly to colorimeter tubes and compared with standards made by diluting a standard solution of quinacrine hydrochloride in water. The standard solution contained 100 mg. of the dye in 100 cc. of distilled water. The most useful dilutions were those yielding 2, 4, 6, 8 and 10 micrograms per cc.

The extremely small amounts of quinacrine indicated by the values in Table I can better be appreciated by recalling that the ordinary tablet of this drug contains 100 milligrams, and that daily doses of one or two tablets are commonly prescribed over long periods of time. There is, of course, no question of systemic poisoning from inhalation of dust at these low levels, but the potency of quinacrine as a local irritant is such that even with the elaborate dust-control equipment to be described later in this paper, a wide variety of symptoms was observed in the workmen. These are described in the following section.

Occupational Reactions to Quinacrine

DURING a period of eight months, 42 men were exposed to the drug. They were distributed as follows:

	Not now working	Now working	Total
Chemical mfg.	9	6	15
Tablet mfg.	20	7	27
Totals	29	13	42

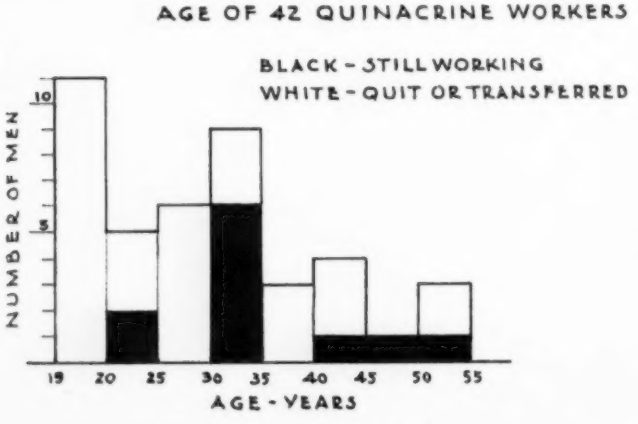
Those not now working were either transferred to other jobs in the factory because of reactions, or resigned because of reactions or because they objected to the work or because they were only temporary employees. The ages of the employees, both working and not working, are shown in nomogram 1. The total exposure of employees of both categories is shown in nomogram 2. These graphs indicate that workers below the age of 20 have poor staying power for this job, that most workers drop out for one reason or another before they have spent 40 days on the drug, and that few workers drop out after spending 100 days.

All reactions caused by quinacrine in our experience had the nature of local irritations, and affected the eyes, nose, skin, and mouth most frequently. Many workers had more than one site of irritation; some were irritated more than once. A certain individual variation in sensitivity was obvious, but except for a few very sensitive men, it was not possible to attribute this any more to a "constitutional" cause than to variations in carefulness and intelligence. Twelve men never complained of any irritation, yet only three of these are still doing this work. Of the nine who dropped out, two were transferred and seven resigned.

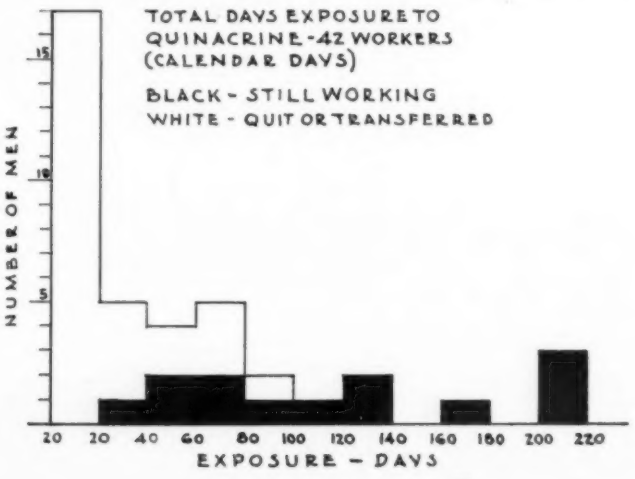
TABLE II.
INCIDENCE OF REACTIONS

	No. of cases	Per cent	Mean exposure before onset	Mean duration of symptoms	Mean lost time from work
Conjunctivitis	22	52	17.3 (1-65)	8.5 (1-25)	2.3 (0-6) days
Keratitis	5	12	26.6 (10-60)	13 (4-24)	1.7 (0-4)
Rhinitis	15	36	19.9 (1-80)	5.7 (1-19)	2.8 (0-7)
Epistaxis	3	7	32.3 (14-61)	11 (2-22)	0
Stomatitis	10	24	14.1 (8-31)	8.2 (4-19)	3.1 (0-6)
Pharyngitis	2	5	55.0 (50-60)	3.0 (1-5)	2.5 (0-5)
Tracheitis	3	7	25.6 (9-56)	7.3 (1-11)	2.3 (0-5)
Bronchitis	1	2	20	5	5
Asthma (or dyspnea)	4	10	27.8 (3-80)	11.8 (1-43)	4.0 (1-10)
Dermatitis	15	36	27.8 (1-180)	12.4 (1-75)	1.4 (0-5)

(Exposure and duration: Calendar days. Lost time: working days)
Figures in parentheses are extreme values.



NOMOGRAM 1


TOTAL DAYS EXPOSURE TO QUINACRINE - 42 WORKERS (CALENDAR DAYS)
BLACK - STILL WORKING
WHITE - QUIT OR TRANSFERRED
NUMBER OF MEN
15
10
5
20 20 40 60 80 100 120 140 160 180 200 220
EXPOSURE - DAYS
NOMOGRAM 2

Conjunctivitis occurred in all degrees; when severe, it was usually accompanied by a superficial keratitis. The most severe case was that of a tablet machine operator who had a broken piece of slug fly into his eye. Despite immediate irrigation, the eye showed deep staining, and subsequently became very painful. Prophylaxis consisted of providing spectacle-type goggles with side-screens for all tablet operators. In some cases, men came to the plant dispensary every day at the end of the shift for irrigation of the eyes with normal saline. They believed this helped them, but there was no objective evidence to prove it. Treatment of established cases consisted of irrigation of the eyes with normal saline, and application of Abbott's holocaine and epinephrine ophthalmic ointment b.i.d. or t.i.d. Cold compresses were prescribed for pain. Severe cases were referred to a single ophthalmologist, so that he might become familiar with their nature. No case ever developed corneal ulceration or permanent opacity. A common source of the quinacrine in the eyes of men in the chemical division were the drops of liquor flying out of centrifuges when the covers were open, as they had to be when the slurry was being run in. It is also suspected that a fine mist of this liquid is present in the neighborhood of the centrifuge at such times. For this reason, it was recommended that men running slurry into centrifuges wear goggles and masks. New workers in the tablet division, and some in the chemical, probably conveyed quinacrine to their eyes in some instances by incautious use of their contaminated hands, but undoubtedly the commonest route for quinacrine in the tablet division was in the form of dust or small flying particles.

Rhinitis began with a sensation of dryness in the nose; mucus blown from the nose was noted to be stained yellow. Gradually there developed a mild soreness in the nose, and mucus was observed to be streaked with blood. Occasionally more marked bleeding occurred. In well-developed cases, the nostrils appeared inflamed and crusted; the nose was seen to be obstructed. These cases were treated by withdrawal from exposure and the occasional use of Abbott's sulfedex (sodium sulfathiazole-desoxyephedrine solution), and recovered in about six days.

Dermatitis appeared more frequently in the chemical division, where manual operations were more frequent, and most commonly attacked the wrists at the sleeve line, the backs of the hands, and the flexor surfaces of the forearms. In the tablet division, the commonest site was the zone of contact between the face and the dust respirator. Rubber gloves did not prevent dermatitis in the chemical division, because in actual practice the drug always gained access to the inside of the glove. Plain cotton gloves, frequently changed, found favor for a time, but they were not uniformly successful. Many experienced men finally preferred to work with bare hands.

Stomatitis and cheilitis occurred frequently in the tablet department, but a few cases were also noted in the chemical division. The following theory of causation has been concurred in by several men affected by this symptom: The workman becomes affected by rhinitis to the point where his nose is too obstructed for free breathing, but is still able to continue working. He begins to breathe through his mouth, and this becomes dry and sore. Objectively, the lips are dry and cracked, and may show a yellow stain. The mucous membranes of the mouth appear normal, but the tongue and gums become so sore that only soft food can be eaten. Pharyngitis without objective signs may accompany this. This condition was treated by prescribing frequent rinses of the mouth with Abbott's metoso (a flavored mouth wash containing metaphen), diluted with three parts of water and used warm.

Four men complained of dyspnea after exposure to quinacrine. Two of these had previously suffered from asthma, and recognized the recurrence of this disease. The two others did not display diagnostic signs of asthma. It was necessary to remove all these men from further contact.

The personal factor of cleanliness and caution is extremely important in determining the incidence of reactions. The only two men with any kind of previous experience in this work were the foremen of the chemical and tablet divisions respectively. Neither of them has suffered any reaction, although at times they worked almost single-handed at all the operations 60 to 70 hours a week. The bulk of the labor supply for this work was recruited from completely unskilled classes, and they had to work and be trained at the same time. Many had never worked in a factory before, and none had ever handled irritating chemicals. These conditions were the result of the labor shortage, and undoubtedly caused many more accidents to occur than would otherwise have been the case. Where personnel could be rigorously selected and given previous training on non-irritating material, and under conditions of the labor market where carefulness and safe habits could be enforced by ordinary discipline, reactions could probably be reduced to a very small figure.

Industrial Hygienic Measures

THE excellent cooperation and advice of the scientific and medical staff of Winthrop Chemical Company, the original makers of quinacrine in this country, enabled us to be adequately forewarned as to the irritating properties of the drug, and afforded us a rare opportunity to plan our equipment so as to avoid needless exposure of the workmen. My particular thanks are due to DR. O. W. BARLOW, whose accurate observations of the symptoms of quinacrine irritation, freely transmitted in a personal communication, have been confirmed in every respect by my own subsequent experience.

Personal Protective Equipment

THE workmen in both the chemical and tablet divisions were furnished with uniforms of the "coverall" type in sufficient quantity to permit a change of uniform daily (Fig. 2). These suits were white, so that the yellow stains would be more forcibly brought to the workman's attention. The cuffs were made to fit snugly by the use of scotch tape, applied fresh daily. As head-covering, many men favored brown paper bags of the right size; over a period of years these have proved effective and practical for protection of the hair from all types of dust, and they have the advantage of being easily replaceable as soon as they become soiled. The use of gloves has already been discussed; in the main, they failed to provide adequate protection for the hands under working conditions.

For eye-protection, a wide selection of goggles was provided. The chemical workers seemed to prefer wide-angle curved-front goggles with perforated metal sides. The operation of charging the reaction-kettles with halocrine and novol diamine required gas-tight goggles with water-troughs to prevent fogging, but some workers preferred a complete helmet furnished with fresh air by means of a pump. In the tablet division a light spectacle-type goggle with plastic sidescreens was found most acceptable, since our purpose was not to exclude dust entirely, but

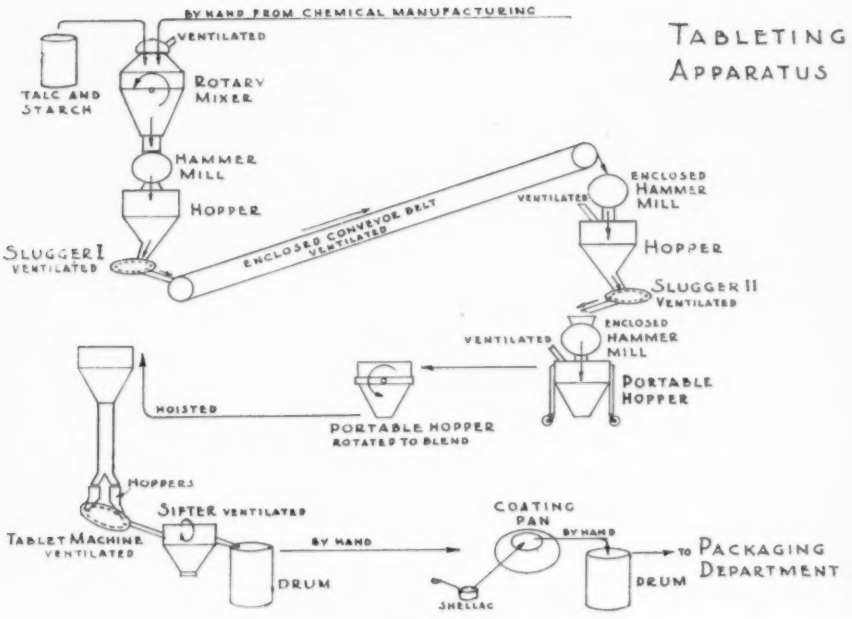


Fig. 3.
Flow sheet of tablet manufacturing operation

Fig. 4.
Slot exhaust fixtures on barrel and mixer

merely to reduce the amount reaching the eyes, and in particular to protect against flying particles which might be ejected from the slug and tablet machines.

M.S.A. "Dustfoe" respirators were most commonly used by the men in the tablet division, and by the chemical operators when they worked in the vicinity of spinning centrifuges or emptied trays of dry quinacrine. However, several other filter-type respirators were furnished to men whose facial contours did not fit the rather unyielding facepiece of the "dustfoe" model. It was found necessary to teach every new operator, especially in the tablet division, a certain rigid technique in the adjusting of the respirator. Experience showed that frequent shifting of the facepiece a few millimeters up or down, right or left, invariably caused a yellow ring to appear on the skin around the nose and mouth. Consequently, the men had to be taught that if they wished to remove their masks or shift them about frequently, they must remove them completely, go to the washroom and wash and dry both the rim of the mask and the face before replacing the mask. This rather arduous routine, as well as the invariable rule that the hand must never be allowed to touch the face or eyes without first being washed, was painfully taught to each new employee, by example and verbally, by the foreman of the department, an intelligent young man with many years' experience in the handling of powerful poisons.

Worker Morale

THE intense yellow staining of the skin, which was bound to occur despite all precautions, especially upon the hands, coupled with the acute discomfort which was visited for a few days upon those who failed to observe the necessary precautions, gave rise to a psychic hazard which required special attention. Rumors appeared from time to time among the workmen that the drug was a systemic poison, permanently injurious to health. The reasoning ran as follows: "Anything that is so powerful it will stain your skin so you can't wash it off must soak clear through your system and poison you. Soon I will be yellow clear through." Fears of this kind were freely expressed to me, and I found they could be easily allayed by pointing out known facts. The men all knew that each tablet contained 100 milligrams, and they knew that the amount of dust in the air had been measured from time to time. It was sufficient to show them how small an amount of quinacrine was in the air, and to tell them that our soldiers took two or more tablets a day for weeks or months, to convince them that no systemic poisoning could exist. It was also found advantageous to spend five minutes immediately following the pre-employment physical examination of these men to describe to them accurately the nature of the material they were to handle. They were frankly told that it was a powerful irritant to the eyes, nose, mouth and skin, and that it would produce conspicuous yellow stains which would not wash off. Then they were told that any operator could avoid irritation if he were skillful, careful and experienced. A few words concerning the vital importance of the tablets to the war effort then sufficed to send them out to the job with good morale.

Engineering Safeguards

TWO basic principles were followed in the design of the machinery of the tablet division: (1) To eliminate open handling of the drug, and (2) To enclose all dust-producing machine parts as completely as possible, keeping the enclosure under negative pressure of great enough magnitude so that the few openings which did exist in the system would be admitting air at a high velocity.

The only open handling required in the entire tablet division was the hand-scooping of quinacrine and excipients into the first mixer. As the table of air-samples shows, this was the most strongly contaminated point in the whole operation. The opening of the mixer was equipped with a removable fixture which draws air at high velocity into a slot along the upper edge of the opening (Fig. 4). A semicircular portable fixture with a curved slot was also provided for attachment to the drums from which the powders are scooped. After the mixer was filled, its opening was covered with a dust-tight lid, fastened on with bolts, and it was rotated on an axis until the powders were thoroughly mixed. This was a completely closed operation, and gave rise to no dust. The rotation was stopped with the tumbler in such a position that its lowermost portion could be attached by means of a dust-tight flexible connection directly to a closed ham-

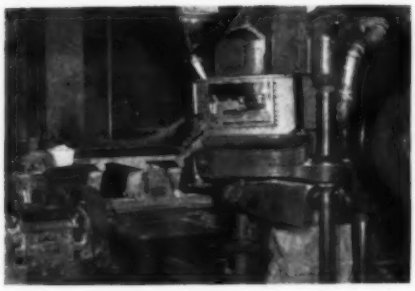


Fig. 5.
Exhaust shield on slug-forming machine; slugs pass to left into an enclosed hammer-mill

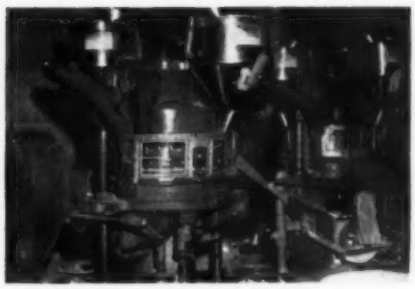


Fig. 6.
Exhausted shield on table machine; ventilator sifter in right foreground

Fig. 7.
Local exhaust fixture on tablet machine opposite punches. Shield (Fig. 6) has been removed

mer mill, into which the powder dropped by gravity. The milled powder fell into a dust-tight hopper which was kept under negative pressure by a small connection to the general exhaust system. This hopper fed directly by gravity into the die-plate of the first slugger. The chief source of dust in the slugger was the dust thrown off the rotating die plate and the dust created each time a punch compressed the powder in one of the dies. Accordingly, sheet-metal hoods were designed to cover the die-plate around its whole circumference, except for small openings at the points where powder was fed in and slugs were ejected (Fig. 5). The hoods were exhausted by flexible connections to the general exhaust system.

Handling of the slugs was avoided by having them discharge directly into a small belt conveyor, completely enclosed and connected to the general exhaust system. This conveyor carried the slugs to the inlet of an enclosed hammer-mill permanently installed over a hopper which fed directly to the second slugger. This hopper was kept under slight negative pressure, and the slugger was protected by an exhausted hood exactly like that described. The slugs dropped from this second slugger into another dust-tight hammer-mill, from which the granulation fell through a flexible connection into one of a series of large portable hoppers made of sheet-metal. These hoppers were provided with an inlet at the top, an adjustable outlet at the bottom, and a small hose-connection at the top by means of which they were connected to the general exhaust system. All these openings could be closed with dust-tight covers.

The portable hoppers, after being filled with granulated material, were lifted with a small electric hoist into frames located over the tablet machines. Flexible hose-connections were attached to the hopper-outlet, and led down to the small hoppers of the tablet machines. By opening a gate, the granulation was allowed to run down the hose into the small hoppers, and thus to feed into the die-plate of the tablet machine. The tablet machine itself was equipped with hoods of sheet metal and transparent plastic similar to those used on the sluggers (Fig. 6); in addition, a special fixture just opposite the two points where the punches drive into the plates locally removed dust at this most important point of origin by means of high-velocity air streams (Fig. 7).

As the tablets rolled out of the machines, they were accompanied by a certain amount of dust, and had therefore to be sifted. This operation was mechanized by having them roll into small rotating barrels of wire mesh which sloped downward at a slight angle. These sifters were surrounded by a metal jacket which was also connected to the general exhaust system. From the sifters, the tablets rolled into drums, ready for transportation to the coating room. Thus a series of operations which, according to the ordinary practice of the trade, would require material to be handled in the open six or eight times was mechanized to the point where only one open handling was required.

All the machinery just described was ventilated by a single blower of the wet centrifugal type, having a capacity of 2000 c.f.m. This was attached through a cyclone dust collector to a manifold system with adjustable outlets for each machine. With all outlets open under operating conditions, the negative pressure in the main manifold duct was four inches of water. Sufficient filtered and heated outside air to balance the exhaust was introduced through a separate system.

As a final precaution, to prevent dust from broken tablets, spilled granulation, or other sources from being scuffed into the air, the tablet division was equipped with a portable vacuum cleaner, and one member of the working force was detailed solely to the task of picking up any stray dust which may appear on any of the working surfaces.

Summary

THE FINAL synthesis, purification, and manufacture into tablets of quinacrine dihydrochloride (atabrine), under wartime conditions, presented a problem in industrial hygiene because of the irritating nature of the drug.

2. Occupational disorders observed in 42 workmen over a period of eight months were found to consist solely of manifestations of local irritation of the mucous membranes and skin. In the order of frequency, these took the form of conjunctivitis, rhinitis, dermatitis and stomatitis. Keratitis, epistaxis, pharyngitis, tracheitis, bronchitis, asthma and dyspnea were also observed in a few cases. Preceding exposure, character, duration and treatment of these symptoms are described.

3. The industrial hygienic methods adopted to control this problem are discussed from the standpoint of (a) personal protective equipment, (b) worker morale, (c) engineering safeguards.

4. Despite an elaborate system of dust-control, which reduced air levels of quinacrine to 0.4 to 4.2 micrograms per liter, irritative symptoms persisted among the unskilled and undisciplined workers typical of the wartime emergency.

DR. FRED J. WAMPLER, Professor of Preventive and Industrial Medicine at the Medical College of Virginia, Richmond, resigned as of October 1, 1944, to become Medical Director of Rustless Iron & Steel Corporation, Baltimore. DR. WAMPLER is well known in the industrial medical field as an author, and as the Editor of and a contributor to "Principles and Practice of Industrial Medicine," published by Williams & Willkins, in 1943.

DR. PILGRIM

—*Continued from page 875.*

hint for the industrial physician, to whom is not unknown what might be designated "compensation fever." For the unabridged extends its definition: "hence, in general, one who shirks his duty by pretending illness or disability" . . . WAS interested to come upon the following in "Manual of Industrial Hygiene and Medical Service in War Industries": *"There has been too great a tendency for industrial hygiene physicians and engineers to gather at official conferences, association assemblies, and annual banquets of medical directors, and discourse at great length on what they are doing to protect the health of workers while in reality their programs fall far short of these objectives. Sometimes the impression is quite evident that these mutual admiration contests are a sort of defense mechanism for what is being left undone. In too many plant medical departments, the primary and often the sole function is to provide reparative service for injuries, and the medical department owes its existence to the fact that the plant is a self-insurer." Conclusions of this kind are the errors into which those fall who learn by hearsay what industrial medicine is thought by some to have been, without having the knowledge that is part of the experience of those who, being in it, are correctly aware of what it was. And such statements as this confirm the persistence of untruths and half truths, such, for example, as the long-trite cliche that industrial medicine was always curative, never preventive. Thirty years ago the A.A.I.P. & S. incorporated in its objectives (see page 8): "to develop methods adapted to the conservation of health among workers . . . ," and wherever industrial medicine is, there it is true of "industrial hygiene physicians and engineers," as to all and each, that "he procureth health where there is none, and continueth and increaseth it where it is." That there are many smaller concerns with only emergency medical service, or no service, is not because the industrial medical and hygiene group could do, and are not doing, what is "being left undone." If *they could, they would.* But more of this anon. . . .

*Prepared by the Division of Industrial Hygiene, National Institute of Health, U. S. Public Health Service. Published by W. B. Saunders Company, 1943.

American Industrial Hygiene Association
News of Local Sections

Chicago Section

THE first meeting of the year 1944-45 of the Chicago Section of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION was held September 28, with 74 members and guests present. Some deviation has been made from the program style of previous years in that two members of the local section have been asked to talk at each meeting to cover recent literature pertaining to industrial hygiene. The medical aspects are to be covered by a physician and the engineering and chemical topics by a technical industrial hygienist. These speakers will share about 15 minutes of the program time at the beginning of each meeting. The first two members who spoke at this first meeting were DR. EDWARD E. DART, of Dodge Chicago Plant, and MR. WARREN A. COOK, of Zurich Insurance Company.

The main speaker of the evening was DR. NORBERT ENZER, of Milwaukee, Wisconsin. DR. ENZER is a pathologist, greatly interested in silicosis, and has done considerable work on this subject during the past few years. Some of his concepts are somewhat different from the classical ideas as expounded by GARDNER and others. DR. ENZER exhibited colored slides of lung sections showing the typical nodular fibrotic conditions, and of x-ray films. The comparison was drawn between a group of 15 welders and 15 foundry workers, both having markings characteristic of second stage silicosis. He went on to show, by means of a number of tests, that there is a great deal of difference between body functions and efficiency of these two groups. Some of these tests were tapping rate, breath holding, strength tests of various muscle groups, work capacity and the flicker fusion test. Of the group of foundry workers that he studied, three were completely disabled and showed nearly all of the typical silicosis symptoms. One member of this group was partially disabled but still able to work. The other six were apparently in a good state of health, although still showing lung shadows on an x-ray film. The 15 welders, all comparatively young men, had been working for periods upward of six years and were in apparently good health.

The tests mentioned were performed on all of these 25 individuals several times, and the scores made on these tests were weighed and scored according to how much they varied from normal individuals taking the same tests. The total scores of each individual showed very conclusively that those people who complained of all the symptoms of silicosis varied considerably from the extremes of normal persons taking the same tests. As a group, the welders did not vary considerably from a normal group. Although the x-ray chest films of these two groups did not show large differences, these tests proved quite conclusively that there were large differences in body functions. DR. ENZER explained this by four slides of sections of lung tissue that had been stained with Prussian Blue for iron. Nearly all of the group of welders showed large amounts of iron pigment in the lung. He stated that he thought this material caused the shadows on the x-ray films. The iron in the lungs of this group of welders did not seem to cause a fibrotic condition in the lung, but this was not evident without staining the lung section. He termed this condition siderosis.

Michigan Section

THE Michigan Industrial Hygiene Society is one of the sponsors of a three-day meeting to be held November 1 and 2, in Detroit, under the auspices of the Detroit Safety Council to cover the principal occupational disease hazards and their control. On the program:

"Vapor Degreaser Operation"—FRANK A. PATTY, General Motors Corporation, Detroit.

"Carbon Monoxide Exposures"—WILLIAM FREDRICK, PH.D., Detroit Bureau of Industrial Hygiene.

"Fluorides from Welding Rods, Magnesium Foundry Operations and other Industrial Exposures"—GORDON P. HARROLD, PH.D., Chrysler Corporation, Detroit.

"Silicosis Prevention"—H. H. SCHRENK, PH.D., U. S. Bureau of Mines, Pittsburgh.

"Lead Poisoning Control"—WARREN A. COOK, Zurich Insurance Companies, Chicago.

"Ventilation"—WILLIAM WITHERIDGE, Detroit Bureau of Industrial Hygiene.

"Organic Chemicals"—DON D. IRISH, PH.D., Dow Chemical Company, Midland, Michigan.

St. Louis Section

THE first meeting of the Industrial Hygiene Society of Greater St. Louis is to be addressed by WARREN A. COOK, of the Zurich Insurance Companies, on October 25, 1944. MR. COOK'S subject will be "Value of Industrial Hygiene Postwar on the Basis of Accomplishments in the War Effort."

New England Section

AN ALL-DAY meeting is to be held in Boston in December for discussion of recent contributions in industrial hygiene by members of this local section. This will be another of the valuable series of meetings following the pattern of previous gatherings of this section.

WANTED: Industrial Hygienist to conduct surveys of industrial plants for large insurance company with complete laboratory facilities and field testing equipment. This is an excellent opportunity for a permanent, *not a war-period*, position. State age, family status, education, experience, qualifications, and minimum salary. Address INDUSTRIAL MEDICINE, 605 N. Michigan Ave., Chicago 11.

THE NINTH Annual Meeting of members of Industrial Hygiene Foundation, an association of industries for the maintenance of healthful working conditions, will be held at Mellon Institute, Pittsburgh, the Foundation's headquarters, on November 15 and 16.

MEDICINE SURGERY

INDUSTRIAL HEALTH
OCCUPATIONAL DISEASES
TRAUMATIC, INDUSTRIAL

INDUSTRIAL HYGIENE
INDUSTRIAL MEDICINE
& RAILROAD SURGERY

Industrial Medicine | Volume 13 NOVEMBER, 1944 Number 11 | Industrial Medicine

This Month

MEDICAL Problems ..... *Wilmer C. Smith, M.D.* 893
—Of the Accident Commission
APLASTIC Anemia ..... *Col. W. Lee Hart, M.C.* 895
—Four Cases among Munition Workers
OCCUPATIONAL Dermatitis ..... *Louis Schwartz, M.D.* 899
—In the Food Industry
MOUTH Infection and Industrial Health. *Earle H. Thomas, M.D., D.D.S.* 900
—A Mouth-Health Program for Industry
PROCAINE Solution ..... *Marvin L. Amdur, M.D.* 905
—In the Treatment of Industrial Trauma
TREATMENT of Injuries ..... *Edward C. Holmblad, M.D.* 907
—The Newer Trends
RE-EMPLOYMENT of Service Men ..... *A. J. Zimmerman* 910
—Job Analysis for Sound Placement
INDUSTRIAL Health Forum (Questions and Answers) 914
PROBLEMS in Industrial Ophthalmology 915
SYSTEMATIC Inorganic Chemistry ... Review by *Wm. D. McNally, M.D.* 915
—(Text and Reference Book by *Yost* and *Russell*)
GOLDEN STATE Hospital ..... C. O. *Sappington, M.D., Dr. P.H.* 916
—Industrial Clinic
THE PLACE of Tantalum in Surgery ..... *C. T. Olson, M.D.* 917
—Experience with Sutures and Foil
THE 1945 "Third War Conference" on Industrial Health 921
—Chicago, April 23-28, 1945
EDITORIAL 926
PROPOSED Industrial Health Foundation ..... *Forrest E. Rieke, M.D.* 928
—A Preventive Medicine Institute
SODIUM SULFACETIMIDE ..... *Joseph J. Toland, Jr., M.D.* 946
—Preliminary Report on Prophylactic Topical Use
(With *Igho Kornblueh*)
OSTEOPATHY in Industry:
—The Employer's Viewpoint ..... *Laurence Ely* 950
—The Industrial Physician ..... *Sydney Mark Kanev, D.O.* 952
INDUSTRIAL HEALTH and DISEASE:
Cotton Fever ..... *Wayne L. Ritter, M.D.* 966
(With *Morris A. Nussbaum, M.D.*)
Re-employment of War Veterans ..... *J. J. Wittmer, M.D.* 970
WAR SEMINAR ..... Reported by C. O. *Sappington, M.D., Dr. P.H.* 974
—Industrial Medicine and Surgery
INDUSTRIAL NURSING:
In-Plant Training and Education ..... *Jesse C. Williams, R.N.* 985
—Of the Nurse in Industry
The Young Nurse ..... *Demaris Urbancek, R.N.* 986
—Her Problems in Industry
The Industrial Nurse's Responsibility ..... *Esther H. Gregory, R.N.* 987
—To the Worker

Personal ..... 8 Comment and Opinion . 34, 962
General ..... 12 Dr. Pilgrim 926
Current Articles of Quality 52
Activities of State Health Departments 980

DR. MILTON H. KRONENBERG'S new industrial identification, as assistant to DR. HAROLD A. VONACHEN, medical director, Caterpillar Tractor Company, Peoria, Illinois, was announced in these pages last month, but the position DR. KRONENBERG left to assume his new duties was incorrectly described. That position—from which he resigned as of October 1—was as Chief, Industrial Hygiene Division, Illinois Department of Public Health. . . . ALTHOUGH the appearance of osteopathy in industrial medical activities has been expected for some time, the fact that it is now a *fait accompli* is news. How and where it was brought about, and by whom, are described on page 952, *et seq.*, for the information of readers who may be interested. ...DR. RIEKE'S painstaking analysis of certain phases of industrial health was directed to a limited number. We enable him here (page 928) to enlarge his "you" to the national scene, his ideas and plans, developed for the Portland area, having elements of applicability elsewhere. DR. RIEKE, with special and peculiar emphasis, confirms what has often been said, namely, that the in-plant (he calls it "in-overalls") point of contact is the beginning point for all industrial health. It has always been that for the curative aspects, and it must be made that for the preventive aspects. Likewise, it is the point at which *health education* must instill and nourish its embryo. There is tremendous significance in the "in-overalls" connotation. It suggests the down-to-earth intimacy in terms of which health is important, and on the plane of which it can be made most interesting. There is much more in this article, however, that will repay a careful reading. . . . DR. OLSON offers his second presentation on tantalum (page 917), touching upon his own experiences with sutures and foil. . . . DR. HEISER'S remarks at the Pepper Committee hearings include the statement that estimates

—*Continued on page 6.*

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A.A.I.N., 1945 "War Conference"..... 921
A.A.I.P. & S., 1945 "War Conference"... 921
A.I.H.A., 1945 "War Conference"..... 921
A.M.A. Council on Industrial Health.... 46
Activities, A.A.I.P. & S. 922
Acute surgical cases 958
American Mutual, seminar..... 974
Anemia, aplastic, four cases, fatal..... 896
Asphalt, fumes from 914
Aspirin, dispensing in plant..... 20
Back, sprains 909
Barnes, E. C. 922
Bloomfield, J. J. 44, 922
Book review, inorganic chemistry..... 915
Bowditch, Manfred 922
Bread, dermatitis, workers in..... 900
Bristol, L. D. (Pepper hearing)..... 30
Brown, Dr. Henry S..... 921
Burlingame, Dr. C. Charles.....52, 924
Burns, tantalum, in dressing..... 920
Burns, treatment 978
Cadmium, welding 914
Cafeteria notes 18
Candy, dermatitis, workers with..... 900
Chemistry, inorganic, book review..... 915
Civilian neurotics 924
Conover, Dr. John R. 44
Controls, toxic hazards..... 38
Corrosion resistance, tantalum..... 917
Cotton fever 966
Cutting-oil dermatitis 980
Dempsey, Catherine R., R.N..... 923
Dental findings, Kansas plant 52
Dental project, Searle 42
Dentistry, and medicine 60
Dermatitis, cutting-oil 980
Dermatitis, in food industry..... 899
Dermatitis, industrial 18, 62
Dermatologic platitudes 48
Disability, in job placement..... 910
Disabled, adjustment to jobs..... 40
Disc cases: backs 909
operations, results 974
Diseases, mouth infection, cause of..... 903
Dispensary, repeaters 20
Drinker, Dr. Philip 922
Eating facilities, statistics 26
Education, in-plant, nurse 985
Electric welding, hazards 978
Emotional factors, effects 28
Equipment, protective eye 915
Examinations, pre-employment 914
Ex-service men, re-employment 910
Eye problems, small industries..... 915
Eyes, bulletin on 34
Fatigue factors 28
Feet, healthy 46
Fever, cotton 966
Fish, dermatitis, workers in..... 899
Fixation, internal, disadvantages..... 894
Foil, tantalum 920
Foker, Dr. L. W..... 922
Food industry, dermatitis..... 899
Foremen, dispensing aspirin..... 20
Form, job analysis 911
Fracture treatment, medical problems.... 894
Fruits, dermatitis, workers in..... 900
"Gangway for an American"..... 924
Golden State, industrial clinic..... 915
Governmental Industrial Hygienists..... 921
Hamlin, Dr. L. E. ("Punch Lines")..... 44
Hand injuries, tantalum in 919
Hazards, electric welding..... 978
Hazlett, Dr. T. Lyle ("Punch Lines").... 44
Health: of the nation..... 982
Health problems: Portland..... 930
small plants 940
Health program: fundamental objective.. 30
nutrition in 26
Heiser, Victor G. (Pepper hearing)..... 22
Holmblad, Dr. Edward C..... 921
Hysterics, mass 958
Illness, statistics 30
Illumination, and visual tasks..... 915
Industrial Clinic, Golden State..... 916
Industrial health: A.M.A. Council..... 46
comment 35
foundation 928
mouth health program..... 900
1945 "War Conference"..... 921
Industrial Hygiene Foundation..... 964
Industrial hygienists, association..... 921
Industrial nursing, aims and practices.... 58
Industrial practice, Minnesota..... 964
Injuries, treatment, trends 907
Intervertebral discs, operations 974
Job analysis: how made 911
in placement 910
Job placement: doctor's part in..... 976
Jones, Katherine, R.N..... 923
Kansas, industrial hygiene activities..... 980
Kehoe, Dr. Robert A..... 922
Labor, "under-dog" psychology..... 40
Lauricella, Dr. John B. (quoted)..... 42
Lanza, Col. A. J. (comment)..... 36
"Light work," return to 910
Littlefield, J. B..... 922
Lucal, Margaret, R.N..... 923
Lundstrom, Elsa H., R.N..... 923
Management, responsibility in health..... 36
Mass hysterics 958
Meat, dermatitis, workers in..... 899
Medical and hospital care..... 32
"Medical care" plan 924
Medical department, plant relations..... 922
Medical schools, Foundation relations.... 944
Medical staff, Foundation..... 942
Medical survey 922
Medicine and dentistry 60
Metallurgical processes, tantalum 917
Milk, dermatitis, workers with..... 899
Minnesota, industrial practice in..... 964
Moth repellant, fumes 914
Mouth conditions, disease caused..... 900
Munition workers, aplastic anemia..... 896
Mutual casualty companies 982
N.A.M., Industrial Health Committee..... 26
N.C.G.I.H., 1945 "War Conference"..... 921
Neuroses, civilian 924
New Jersey, health bureau activities..... 980
Neurosis, army dischargees 26
Newquist, Dr. Melvin N..... 921
Non-union 895
Nurse: in-plant training 985
young, problems 986
Nurses: industrial, wage law..... 44
responsibility to worker 987
Nutrition, industrial 18
Nutrition, workers', New Jersey..... 42
Nuts, dermatitis, workers 900
Occupational complaints 958
Officers, associations 921
Operation requirements, jobs 911
Operative procedure, discs 974
Organization plan, Golden State..... 916
Osteopathy, in industry 952
Penicillin therapy 976
Pennsylvania, health activities..... 980
Pepper Committee hearings, excerpts..... 22
Personnel, non-medical 28
Physical fitness program 22
Physical therapy, treatment, trends..... 908
Physician, in job placement..... 910
Pickling, dermatitis, workers..... 900
Placement: qualifications 912
servicemen, job analysis 910
Plant relations, medical department..... 922
Pneumonia, in shipbuilders 50
Poison, silver nitrate 915
Portland, industrial health problems..... 930
Praise, as worker influence..... 34
Pre-employment hazard 964
Prevention, dermatitis 900
Preventive medicine: definition 932
proposed institute 928
Problems, young nurse, in industry..... 986
Procaine solution, trauma, treatment..... 905
Procedures, surgical 895
Program Committee, A.A.I.P. & S..... 921
Public health, relations with..... 944
"Punch lines" 44
Purcell, Martha, R.N..... 923
Raskin, Morris (Pepper hearing)..... 28
Red tape, incident 38
Re-employment, war veterans 970
Reeves Sound Laboratory 950
Rehabilitation, veteran, comment 36
Rehabilitation, "vs. money" 52
Re-orientation, veterans, comment..... 40
Report, on sodium sulfacetamide..... 946
Research, Foundation basis 942
Pacific Foundation 916
Respirators, how handled 980
Responsibility, nurse 987
Results, disc operations 974
Sayer, Henry D. 44
Schrenk, H. H. 922
Seminar, American Mutual 974
Sennewald, Elizabeth, R.N. 923
Shock, and plasma, therapy..... 978
Shoes, re-issue 914
Shoudy, Dr. Loyal A. 921
Shoulder joint, medical problems..... 893
Sickness insurance, incident 85
Silver, toxicity of 914
Slobe, Dr. Frederick W. 921
Smyth, Henry F., Jr., Ph.D..... 44
Sodium sulfacetamide, use 946
Small industries, eye problems..... 915
Small plant health problems..... 940
Standards, ASA 964
State Accident Commission, medical..... 893
relation of industry with..... 942
Stralko, Victoria, R.N. 923
Suggestions, 1945 "War Conference"..... 921
Supervisor, in placement 972
Surgery, tantalum in 917
Survey, medical department 922
Sutures, tantalum 919
Tact, in handling patients 909
Tantalum, place in surgery 917
Terminations, women, reasons..... 34
Therapy: penicillin 976
shock and blood plasma 978
Therapy, veteran problems 34
Toxic controls 38
Toxicity, of silver 914
Training, in-plant, nurse 985
Trauma, industrial, in treatment..... 905
Treatment, industrial injuries 907
Tuberculosis, workers' interest..... 35
"Under-dog" psychology, labor 40
Union, Foundation relations 944
Vegetables, dermatitis, workers with..... 900
Venereal disease conference 20
Vertebra, wedge-shaped 978
Veterans: disabled 970
re-employment 910
doctor's part in placement..... 976
Foundation relations 944
Virginia, occupational diseases..... 980
Visual acuity, comment 38
Wage law, industrial nurses..... 44
Wall-chart, occupational diseases 964
"War Conference," 1945, schedule..... 921
War veterans, re-employment.....910, 970
Warner & Swasey (quotation)..... 924
Weils's disease 914
Welding, cadmium 914
Welding, electric, hazards..... 978
Wire, tantalum, qualities 919
Women, ODT discovery 34
Worker, education, nurse in..... 988
Worker, nurses' responsibility to..... 987
X-rays, in fracture treatment..... 907
Yant, William P., Ph.D..... 44
Yodis, Frances, R.N..... 923

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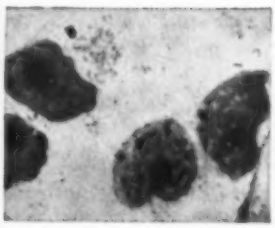

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—*Continued from page 3.*

regarding the first million men discharged from the Armed Forces indicate 30% of them had some form of psychoneurosis (page 26). DR. FETTERMAN (The Mind of the Injured Man) says: "A neurosis is a form of illness which arises from internal conflict or external stress and is not the result of physical causes. . . . The major characteristics are fear, preoccupation with self and symptoms, a demand for attention, and a marked influence of the environment upon the symptoms. . . . Psychosis is the modern name applied to those derangements formerly called insanities. . . . Some authors and many lay persons use the terms 'psychosis' and 'neurosis' interchangeably. . . . The neurotic may maintain his proper place in the family and society; the psychotic may consider himself as an entirely different person, possessed by special powers, receiving private messages, perhaps chosen by God to lead mankind. . . ." Obviously, the combination of the two words has medical significances of an infinitely wide scope. And, obviously too, its lay meanings invest it with direful implications. It should not, therefore, be too commonly employed, even in a "working diagnosis." Yet, in the services, it seems to be one of the most freely used in the medical vocabulary. The use there may be necessary—though, more likely it is in lieu of a better term or terms not yet evolved. But why confine it to the service men, when, as every thinking person will admit, the application is more widely, and even more specifically, deserved among civilians in all walks of life? This is not to imply that the term be given to the large percentage of civilians to whom it belongs, but only to suggest that it be *not* applied to so many service men when they return to civilian status. The carry-over will merely further complicate an industrial-medical situation which is already complicated enough. . . . JUST recently a physician, endeavoring to help out in the war effort, volunteered his services in an industrial plant and was offered $150 a month for half his time; that was what "the position paid." Of this, more later. . . . AS DR. PILGRIM might phrase it: "Receiving letters and calls in compliment of the October issue of this journal, the said compliments, however, belonging to the authors of the articles therein, and particularly to DR. CARLISLE and DR. WELLMERLING, to whom, and to the others, they are hereby appreciatively conveyed."

A.S.R. Corp. Surgeon's Division....935
Surgeon's Blades and Handles
Alkalol Company, The 966
Alkalol
Aloe, A. S., Company 20
Aloe Quality Cotton Elastic Bandage
American Optical Company 959
AO Respirator
Ames Company, Inc. 22
Clinitest
Anglo-French Laboratories, Inc. 12
Hepvisc
Ballard, James F., Inc. 10
Campho-Phenique
Bard-Parker Company, Inc. 957
Rip-Back Blades
Bauer & Black 11
Curity Ostic Plaster Bandages, Splints
Bausch & Lomb 13
Safety Eyewear
Becton, Dickinson & Co.....26
B-D Yale-Lok Needles, Syringes
Breck, John H., Inc. 943
Breck Work Cream
Bristol-Myers Company 983
Sal Hepatica
Burdick Corporation, The 63
Burdick Solarium Shower
Burroughs Wellcome & Co., Inc. 17
Vaporole Ephedrine Isotonic Solution
Burroughs Wellcome & Co., Inc.....931
'Empirin'
Cambridge Instrument Company, Inc. 28
All-Electric Electrocardiograph
Carbisulphoil Company 49
Foille
Cereal Institute, Inc. 955
Cereals
Ciba Pharmaceutical Products, Inc. ....4th Cover
Coramine
Crookes Laboratories, Inc. 972
Enzo-Cal
Denver Chemical Mfg. Co., The 46
Acetone Test (Denco) Galatest
Denver Chemical Mfg. Co., The 968
Antiphlogistine
Desetin Chemical Company 30
Desetin Ointment
Dome Chemicals, Inc. 52
Domeboro Tabs; Doxalon; Domolene
Drug Products Co., The 48
Sulfarea; Sclorea
Electro-Physical Laboratories, Inc. 45
EPL Cardiotron
Ethicon Suture Laboratories 58
Emergency Sutures
Flint, Eaton & Company 54
(Topical) Sulfanomides
General Cellulose Co., Inc., The 40
Cellulose Wipes
General Electric X-Ray Corporation 927
G. E. Photo-Roentgen Unit
Health Cigar Co., Inc. 16
Sano Cigarettes
Hoffman-La Roche, Inc. 23
Laracol Wafers (Roche)
Hynson, Westcott & Dunning, Inc. 932
Mercurochrome
Iodine Education Bureau, Inc. 928
Iodine
Irwin, Neisler & Company 19
Benzamol
Johnson & Johnson 1
Red Cross "ZO" Adhesive Plaster
Johnson & Johnson 939
Red Cross Plaster
Kny-Scheerer Corporation 33
Surgical Instruments
Kolar Laboratories, Inc. 35
Protective Creams; Skin Cleansers
Kopertox Laboratories 55
Kopertox
Leaming, Thos., & Co., Inc. 2
Calmitol
Leeming, Thos., & Co., Inc. 60
Baume Bengué Analgésique
Lever Brothers Company 37
Vimms
Lily-Tulip 980
Paper Cups and Food Containers
Lilly, Eli and Company 64
"Central Terminal"
Machlett Laboratories, Inc. 933
Ray Tubes
McNeil Laboratories ....2nd Cover
Aspirocal
Medicone Company 977
Rectal Medicone
Merck & Co., Inc. 39
Vitamins
Merck & Co., Inc. 42
Cuprex
Merrell, The Wm. S., Company 31
Oravax, Oral Catarrhal Vaccine
Merrell, The Wm S., Company 949
Nethacetin
Milburn Company, The 941
Ply Creams and Liquids
Mine Safety Appliances Company 937
M.S.A. Fend Creams and Lotions
National Drug Company 41
Staphylococcus Toxoid-Vaccine Vatox
National Oil Products Company 47
Acidolate Skin Cleanser
New York Pharmaceutical Company 18
Hayden's Viburnum Compound
Norwich Pharmacal Company, The 38
Unguentine
Numotizine, Inc. 50
Numotizine Ointment
Nutrition Research Laboratories 14, 15
Ertron
Occy-Crystine Laboratory 34
Occy-Crystine
Owens-Corning Fiberglas Corporation 929
Fiberglas
Packwood, G. H., Mfg. Co. 945
Pax
Parke, Davis & Company 7
Immunovac
Patch, The E. L. Company 18
Gadoment
Pineoleum Company, The 36
Pineoleum
Progressive Laboratory Specialties Company 40
Klo-Saver Aprons
Reynolds, R. J. Tobacco Company 981
Camel Cigarettes
Riedel-de Haen, Inc. 32
Decholin
Roerig, J. B., & Company 953
Heptuna
Sacro-Iliac Belt Co. 4
Sacro-Iliac Belt
Schenley Laboratories, Inc. 9
Penicillin
Schmid, Julius, Inc. 984
"Ramses" Diaphragm
Schoonmaker Laboratories, Inc. 48
V-E-M
Seamless Rubber Company, The 965
Pro-Pak Gauze
Searle, G. D., & Co. 5
Floraquin
Sharpe & Dohme 51
'Lyovac' Normal Human Plasma
Sherman Laboratories 43
Shervac Oral Cold Vaccine
Shield Laboratories 961
Riasol for Psoriasis
Singer Sewing Machine Company 61
Surgical Stitching Instrument
Sklar, J. Manufacturing Company 62
Surgical Instruments
Smith, Kline & French Laboratories 973
Benzedrine Inhaler
Squibb, E. R. & Sons 925
Sulmefrin
Stearns, Frederick, & Company 21
Neo-Synephrine Sulfathiazolate
Stepan Chemical Co., The 969
pH6 Skin Cleanser
Tallby-Nason Company 44
Vitagunent
Tampax Incorporated 59
Tampax
Tarbonis, The, Company 27
Tarbonis
Treasury Dept., U. S. 975
U. S. War Bonds
Wallace & Tiernan Products, Incorporated 24
Desenex
Wallace & Tiernan Products, Incorporated 25
Azochloramid
Wander Company, The 979
Ovaltine
Warner, William R., & Co., Inc. 951
'Gelusil' Antacid Adsorbent
Waugh Laboratories 930
The Berman Metal Locator
West Disinfecting Company, The 967
Sulpho Hand Cleaner
White Laboratories, Inc. 56, 57
Sulfathiazole Gum
White Laboratories, Inc. 29
White's Neo-Multi-Vi Capsules
Whitehall Pharmacal Company 963
BiSoDol
Whitehall Pharmacal Company 971
Anacin
Whittaker Laboratories, Inc. 10
Cooper Creme
Willson Products Incorporated 934
Willson Protecto Shield
Winthrop Chemical Company, Inc. 53
Pluravit
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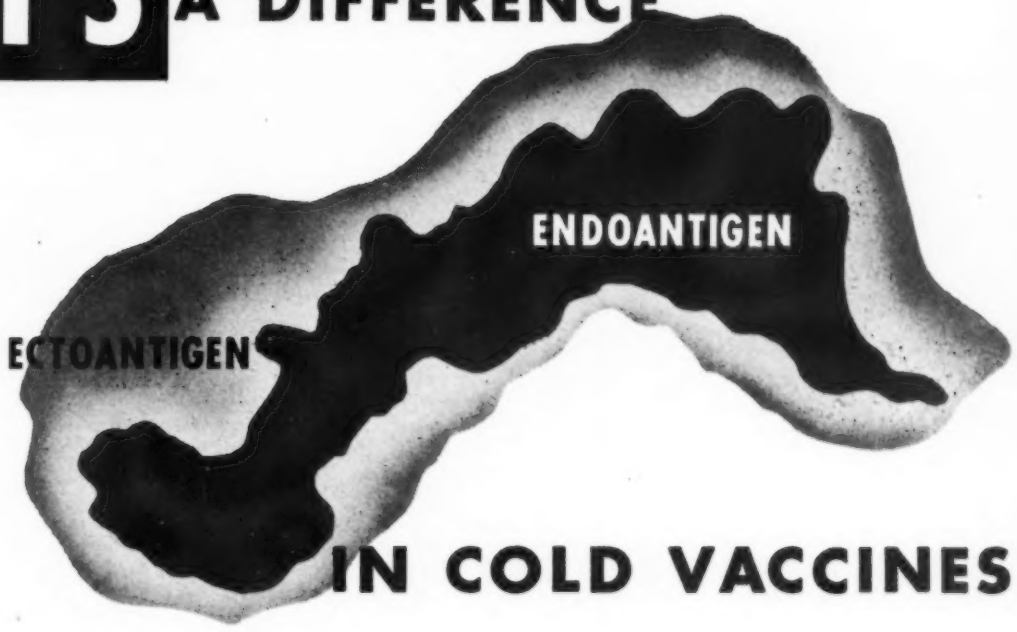

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DR. H. GLENN GARDINER, since July 1, 1942, Medical Director of Foote Bros. Gear & Machine Corporation, Chicago, has resigned, effective November 30, to become affiliated with Oldsmobile Division, General Motors Corporation, at Lansing, Michigan, where he will be Associate Medical Director.

DR. WAYNE L. RITTER, Surgeon (R), Director of Mississippi Division of Industrial Hygiene for the past two years, has been assigned by the U. S. Public Health Service to the Kentucky State Department of Health to serve as Director of the Bureau of Industrial Hygiene succeeding DR. W. E. DOYLE, recently appointed assistant to the medical director, U.S.P.N.S., at Washington, D. C.

THE following officers of the Industrial Hygiene Section of the American Public Health Association were elected at the meetings in New York, October 3-5, 1944: Chairman, T. LYLE HAZLETT; Vice-Chairman, H. H. SCHRENK; Secretary, C. M. PETERSON; To the Section Council, five-year term, HERBERT DYKTOR; Section Representative to Nominating Committee for Governing Council Members, C. O. SAPPINGTON.

DR. EARL C. BONNETT, formerly Associate Medical Director, Metropolitan Life Insurance Company, has been appointed Medical Director of the company. DR. BONNETT succeeds the late DR. CHARLES L. CHRISTIERNIN, who died on October 18. As head of the company's medical division, DR. BONNETT will supervise a staff of about 8,000 physicians who serve as medical examiners for Metropolitan in the United States and Canada. He will be responsible for the formulation of rules for the medical examination of applicants for insurance, and advise in the establishment of rules for the selection of risks. His duties will also involve the management of home office health activities, which include the medical care and periodical physical and dental examinations of some 14,000 employees. DR. BONNETT is a native of Provo, Utah. While a student at Cornell, he enlisted in the Army in 1917, and served in the first World War as a private, sergeant and second lieutenant in the Field Artillery. He saw combat service with the 147th Field Artillery, 32d Division, A.E.F., in the Meuse-Argonne offensive. In 1919, he graduated A.B. at Cornell, and resumed the study of medicine, receiving his

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M.D. at Cornell Medical College in 1923. He entered the service of Metropolitan in 1926, as a medical examiner in the home office, and was advanced to official rank as an assistant medical director in 1928, and promoted to associate medical director in 1944.

DR. W. IRVING CLARK, Clinical Professor of the Practice of Industrial Medicine, Harvard School of Public Health, and Personnel and Medical Director, Norton Company, Worcester, Massachusetts, gave the October 31 lecture on "Problems in Industrial Medicine," the second in a series of 10 lectures sponsored by the Worcester Foundation for Experimental Biology and the Worcester State Hospital.

R. LOUIS MARK, Columbus, Ohio, is Chairman of the Committee on Occupational Diseases of the Chest, for the American College of Chest Physicians.

DR. RALPH F. HARLOE, 64, Director of Thoracic Surgery at Kings County Hospital, Assistant Professor of Surgery at Long Island College of Medicine, Brooklyn, for the last 19 years, and a charter member of the ASSOCIATION FOR THE ADVANCEMENT OF INDUSTRIAL MEDICINE AND SURGERY, died August 2. DR. HARLOE was born in Poughkeepsie, New York, graduated in 1899 from Brooklyn College of Pharmacy, and in 1918 from Long Island College of Medicine.

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—*Modern Medicine Topics*, October, 1944.

Central States Meeting

CENTRAL STATES SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY will hold its mid-winter clinical meeting on Friday, December 8, 1944. The morning will be given over to clinics at Cook County Hospital and the afternoon and evening to panel discussions and a dinner. The afternoon subject is to be "Fracture Fixation," with DR. E. C. HOLMBLAD, Moderator; and the evening discussion will take up "Head Injuries," with DR. FRED M. MILLER, Central States President, presiding.

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THE De Lamar Institute of Public Health, College of Physicians and Surgeons of Columbia University, is conducting a program of instruction in the teaching, practice, and research in the field of industrial dentistry, in New York City, December 11-15, 1944. The tuition fee is $25, and applications should be addressed to: Director, De Lamar Institute of Public Health, 600 W. 168th St., New York 32, New York.

Industrial Hygiene at De Lamar

DR. H. S. MUSTARD, Director of the De Lamar Institute of Public Health, Columbia University College of Physicians and Surgeons, New York, announces that the Institute will offer an intensive course in industrial hygiene during the period October 30 to December 6, 1944. According to DR. MUSTARD, the course will be so arranged that in any given week instruction will be focused upon one important phase of the subject and the students in

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the course may register for one or more weeks. The weekly schedule follows: October 30 — Dermatoses; November 6 — Dust Problems and Hazards; 13—Medical and Surgical Aspects; 20—Plasticizers and Solvents; 27—Metals; December 4—Administrative Aspects; 11—Dental Problems and Services. Persons interested should communicate with the Director, 600 West 168th St., New York 32, New York.

Urology Award

THE American Urological Association offers an annual award "not to exceed $500" for an essay (or essays) on the result of some specific clinical or laboratory research in urology. The amount of the prize is based on the merits of the work presented, and, if the Committee on

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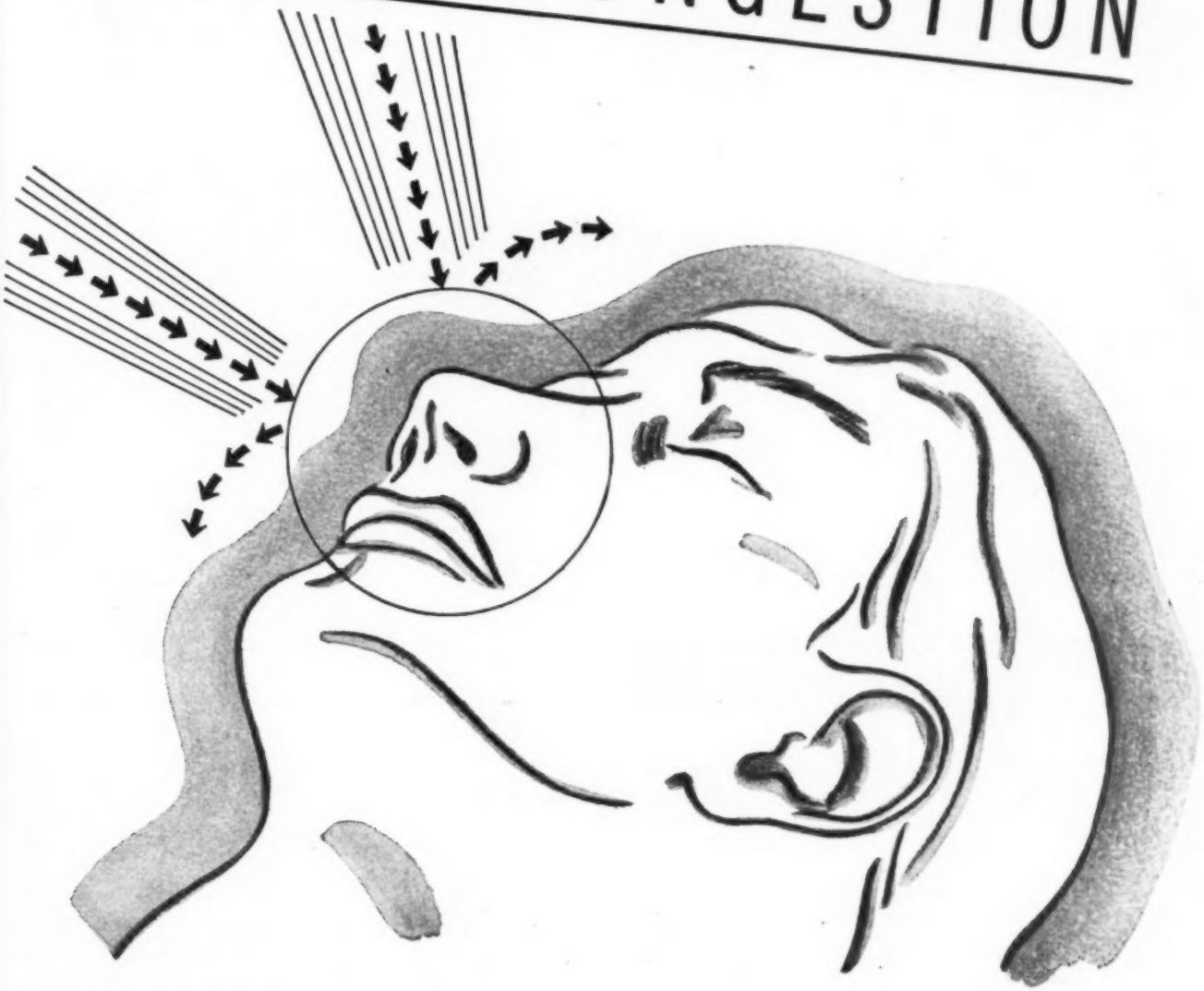

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Scientific Research deem none of the offerings worthy, no award will be made. Competitors are limited to residents in urology in recognized hospitals and to urologists who have been in such specific practice for not more than five years. All interested should write the Secretary, for full particulars. The selected essay (or essays) will appear on the program of the forthcoming June meeting of the American Urological Association. Essays must be in the hands of the Secretary, Dr. Thomas D. Moore, 899 Madison Avenue, Memphis, Tennessee, on or before March 15, 1945.

Massachusetts Industrial Nutrition

THE Massachusetts Division of Occupational Hygiene, in cooperation with the Associated Industries of Massachusetts, has begun what is intended to be a weekly menu and nutrition service available to Massachusetts industries. The service is designed to aid managers of company-operated plant cafeterias by providing a carefully planned menu with suggested meal combinations that are nutritionally adequate and which observe ration allotments. The service facilitates the use of the cafeteria as an effective tool in a nutrition education program. QUINDARA OLIVER DODGE is Chairman of the Subcommittee on Industrial Nutrition of the State Committee on Public Safety, Boston.

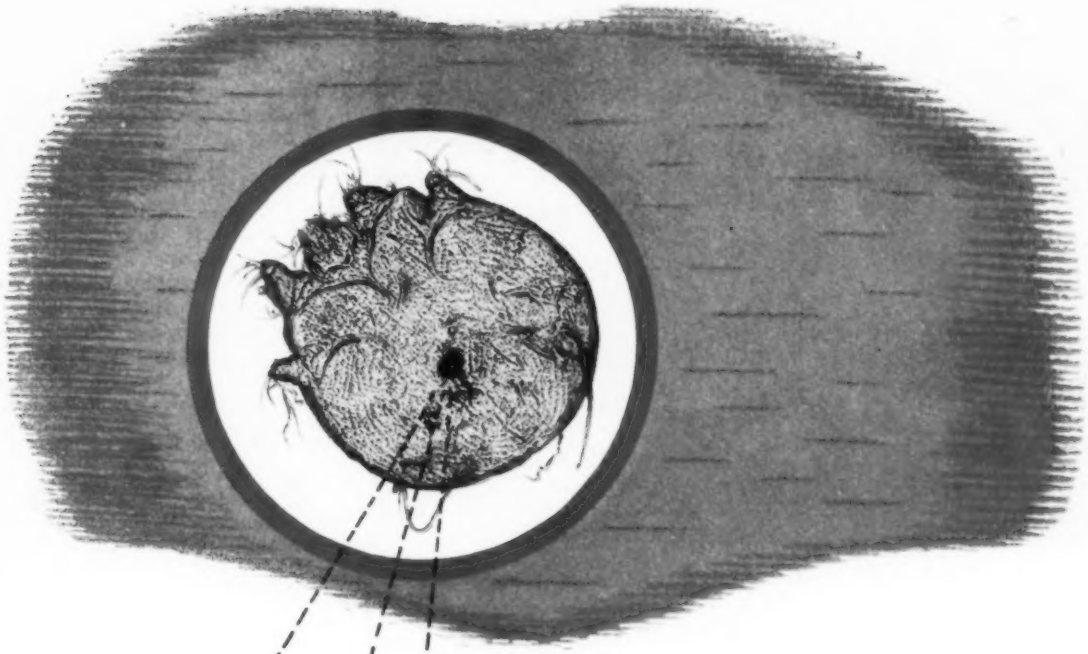
Industrial Dermatitis

THE Industrial Hygiene Division has completed a survey of a dermatitis outbreak in a plant where tubes are made for launching rocket bombs from airplanes. The tubes are made from paper glued together with a low polymerized phenol formaldehyde resin which is then completely polymerized with heat. The workers' hands and shoes are soiled with the resin as it spreads over the paper while the paper is rolled into a cylinder. Of 150 workers employed, 78 developed dermatitis. Of 480 men hired, only 180 remained on the job. Production was cut to less than 10%. Findings and recommendations were: (1) The unpolymerized phenol formaldehyde resin used as a glue was the irritating agent. (2) Workers should wear sleeves, aprons and gloves made of fabrics impervious to the glue; two pairs of gloves should be used, changing at each half shift. (3) Washstands should be placed at strategic places to facilitate frequent washing of the parts of skin soiled. (4) A special cleanser was recommended for removal of the glue from the skin because ordinary soap works imperfectly. (5) Methods of treatment were recommended. An outbreak of dermatitis occurring principally on the forearms and bare legs, in a plant manufacturing jungle hammocks for soldiers in the South Seas, was also surveyed. It was found that a chemical used to prevent mildew in the fabric was the cause of the dermatitis. Wearing of sleeves and stockings to prevent contact with the fabric as it was sewed on the machine, was recommended.

—From *Military Surgeon*, October, 1944.

Cafeteria Notes

DISHLOADING Stations" are conveniently located at the two exits from the cafeteria in the Westinghouse Electric Company's Lima, Ohio plant. Patrons leave their soiled dishes at these "stations" on their way out. The "stations" are designed to conceal completely all garbage barrels and dish trucks, are thus much more attractive than a dish truck of dirty dishes moving up and down the aisle, and employee cooperation makes self-bussing work. . . . BELIEVING that dining room atmosphere has a definite relationship to the morale of the customer, the Falk Employees' Cooperative of Milwaukee, Wisconsin, set out to create more pleasant surroundings in their cafeteria. Soiled, dingy walls were redecorated in cool, restful, blue-green with light-ivory colored ceilings. Large, scenic, photographic murals on an eye level with the customer were used to decorate the walls. Ivory finished, quartet tables, which afford more privacy for industrial workers when dining, replaced the long, institution-type tables. Opening off



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	Each	Per Doz.
HH5934—Aloe Cotton Elastic Bandage with "VINYON E," 2-inch width	$0.63	$ 6.30
HH5935—Same, 2½-inch width	.76	7.65
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HH5937—Same, 4-inch width	1.12	11.25

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from the main dining room, a special dining room with gaily colored wall paper, now invites special conference groups to dine in pleasant surroundings.

—Industrial Nutrition Service.

VD Conference

A NATIONAL venereal disease control conference is being conducted under the auspices of the U. S. Public Health Service at St. Louis, Missouri, November 9, 10 and 11. Leading experts on venereal disease control from the United States, and from some other nations, will consider international and post-war venereal disease control, and other specialized subjects such as new methods of treating the venereal diseases, diagnosis, epidemiology, education, and moral, social, and community influences. State and local health officers, venereal diseases control officers, practicing physicians, and others engaged in venereal disease control activities are invited to attend. The 1944 conference will be the third national venereal disease control conference. The first, conducted in 1936, in Washington, resulted in establishing the national venereal disease control program which has been expanded and continued to the present time. The second conference was conducted at Hot Springs, Arkansas, in 1942, to consider wartime venereal disease control. The program for the 1944 conference, as announced by the Public Health Service, lists the names of the individuals or organizations invited to present papers and conduct meetings and discussions.

Aspirin

NEWSPAPERS reported on August 12 that DR. J. LYNN MAHAFFEY, Trenton state director of health, made a recommendation to the Ford Motor Company at Edgewater that it discontinue a recently established practice of allowing foremen to dispense aspirin (acetylsalicylic acid) to workers complaining of minor ailments. It was stated that the health director also recommended that the company revert to its old procedure of allowing workers complaining of minor ailments to visit, on the company's time, first aid stations in the plant staffed with medical personnel (*J.A.M.A.*, September 9, 1944.) The significance of this prompted inquiry as to the details of the incident, which are as follows: At the request of the local union of the Ford Motor Company, Edgewater, a representative of the New Jersey Bureau of Industrial Health visited the plant and union officials in regard to an industrial health problem. Frequent visits had been made by workers to the plant medical department to obtain aspirin for minor ailments. Since the factory is about 1500 feet long, some of these persons required a considerable period of time in order to leave their departments, walk to the dispensary, receive treatment and return to their departments. The company felt that production efficiency would be improved if those persons who wanted nothing but aspirin would ask their foreman for it and thus avoid the loss of time that a trip to the medical department entailed. Foremen were given a stock of aspirin tablets packaged two to a sealed envelope, with the envelopes properly labeled. These were dispensed by a foreman in moderate quantities to those persons—and only those—who specifically requested aspirin. The union felt however, that this was not the best practice from the standpoint of being assured the best medical treatment for minor sicknesses. The union said also that the company had begun to deduct time from those workers who still went to the plant dispensary for minor illnesses. Following the visit, a report was sent to the plant and the union, suggesting the following: (1) Medical treatment should be given only by a physician or nurse acting under a physician's direction. (2) For a 60-day period, the dispensary should keep an accurate record of those workers who made repeat visits for non-occupational illnesses (experience has shown that plant first-aid treatments are not distributed evenly among the whole working population but are concentrated on a small group who return repeatedly. (3) If the above list shows that "repeaters" are the ones who account for most of the aspirin cases, the list should be turned over to the union which would then exert its own influence on these repeaters to

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see that none of them is taking undue advantage of the plant's medical service. (4) If, after that, the condition is still unimproved, a physician or nurse should periodically cover the plant and give minor redressings and dispense minor drugs to the workers while on their jobs. This report did not relate to the efficacy of aspirin as a therapeutic agent, but only to administrative procedures in the industrial health program of the plant.

Physical Fitness Program

CONFLICTING views on the government's rôle in dealing with postwar health problems were heard in Washington when representatives of medicine, labor and industry testified at a three-day hearing September 17-19 before the Senate subcommittee on wartime health and education (Pepper committee). Statements were made at the hearing by the A.M.A., the A.F.L. and other organizations on the problems arising from the report that five million American men were rejected for selective service because they were physically unfit. It was understood that representatives of the dental profession would testify before the subcommittee at a later date. A national health plan in which physicians and research, hospital and other health personnel would be destined to cooperate with state and local governments to assure adequate health care was proposed by Thomas Parran, Surgeon General of the U. S. Public Health Service. This plan was strongly endorsed by representatives of the A.F.L., but most medical witnesses were opposed to any plan so extensive as to place great numbers of the medical profession on a salaried basis. Representatives of the A.M.A. cautioned against too wide-sweeping plans for government control and any system that would tend to change present methods of compensation for physicians. Roger I. Lee, president-elect of the medical organization, said that means of cooperation in a general plan could be found, but explained that the physician's point of view was directed against anything "which would tend to diminish the standards of the medical profession." Another medical official pointed out that approximately one out of six men was rejected for remediable defects and "that the greatest significance in reports of rejections would seem to be the notable lack of self-interest" on the part of the rejectee. LEVERETT D. BRISTOL, chairman of the health advisory council of the U. S. Chamber of Commerce, urged the appointment of a national commission to direct state experiments as a preliminary to selecting the type of action which would ultimately become a country-wide program. He suggested that government health authorities and representatives of the health professions and of Industry and Labor should be represented on the commission that would encourage plans for local health care. Sen. Claude Pepper, Florida, chairman of the subcommittee, intimated that Congress might be prepared to authorize appropriation of dollar-for-dollar amounts to be given in aid to state health projects. The idea, he said, would go far toward useful government action, at the same time reconciling medical men to the subsidizing of medicine.

—From *J.A.D.A.*, mid-monthly issue, October 15, 1944.

PEPPER COMMITTEE

EXCERPTS from statements prepared for the U. S. Senate Subcommittee on Wartime Health and Education, Claude Pepper, Chairman, Washington, D. C., September 19, 1944.

VICTOR G. HEISER, M.D., Chief Medical Consultant, N.A.M.: Selective Service brought to light a fact that most medical men have long known, namely, that our society needs extensive health repairs. The re-appraisal of American manhood through Armed Service tests brought us face to face with the fact that some 4,000,000 young men lacked the physical and mental ability to bear arms in this hour of grave emergency. Other, unrelated surveys confirm the growth of social debility. A recent study made in New York revealed that on an average day 280,000 of the city's population were disabled by illness, that this number rose to 700,000 when those suffering from chronic ailments, although not bedridden, were added. And that is an average day's record in the nation's greatest city. The basic reason for this undermining of America's physical fibre is comparatively simple. It is the lag between knowledge and its application, between discovery and usage. The main objective of organized medicine, of the Rockefeller and similar Founda-

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Antiseptics and Their Action, R. M. Freeman: *Industrial Medicine*, February, 1940.

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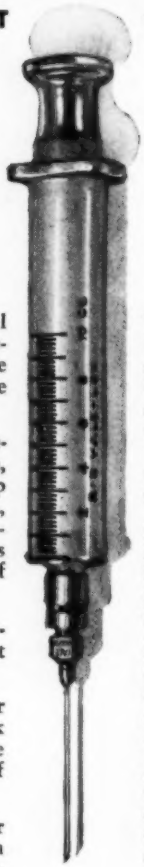
A glance at the Huber Point design reveals why it reduces pain, trauma, and seepage. The sharp point, followed by the smooth, closed bevel, minimizes tissue disturbance and pain. It simply slits skin and tissue, the elasticity of which helps to control seepage.

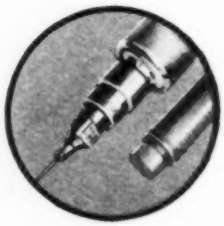
B-D Yale-Lok Needles are supplied with regular or Huber Point at the same price.

B-D Yale-Lok Needles — with or without the Huber Point — lock on B-D Yale-Lok Syringes. Please be sure to specify Huber Point if you wish to receive it.

B-D Yale-Lok Needles with Huber Point are at present available from 18 gauge to 27 gauge. With regular point all standard gauges and sizes, from 13 gauge to 27 gauge, are furnished.



B-D YALE-LOK SYRINGES with METAL LOCKING TIP



The B-D Yale-Lok Syringe costs less to use than *any* all-glass syringe — because it eliminates tip breakage. Over 50% of the breakage of all-glass syringes occurs at the tip. Fewer replacements are needed as the Yale-Lok outlasts two or three all-glass syringes. The metal tip is *permanently* attached.

B-D Yale-Lok Needles lock on B-D Yale-Lok Syringes, with a half-turn, preventing leakage, jamming, or slipping off. A slight turn releases the needle.

B-D Yale-Lok Syringes are priced the same as B-D Yale all-glass syringes.

The larger tip outlet of the B-D Yale-Lok Syringe permits easier injection of viscous fluids. Large size Yale-Lok Syringes do not require reducing adapters. The same dimension Yale-Lok tip is used on all sizes.

B-D Yale-Lok Syringes are available in 2 cc. to 100 cc. sizes.

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tions has been to reduce the lag between medical knowledge and its practical, intelligent application. The main stumbling block to this end has been the lack of coherent, unified educational force, the tragic lack of a central program for protective prevention of illness, and one which would care for the poorest citizen victimized by disease or accident. INDUSTRIAL HEALTH PROGRAMS: A Committee on Healthful Working Conditions was organized by the National Manufacturers' Association in 1937. This committee, comprised of manufacturers and advised by a group of highly skilled industrial physicians, instituted a survey on industrial health in 1940. The survey covered 47 states and 2,064 companies employing a total of 1,945,551 workers to determine the extent, development and effect of factory health programs. Its findings were significant. In those firms operating definite health programs: accident frequency was cut 44.9%; occupational disease, 62.8%; labor turnover, 27.3%; absenteeism, 29.7% and compensation insurance payments, 28.8%. Great as the strides made by industrial health practices are, there is still a need for further efforts, especially in those plants employing fewer than 500 employees. As a result of continuing programs, general industrial health is above the public average as statistics prove. Figures on wartime absenteeism show that on the average, sickness and accidents account for 10 days a year per employee. Of this 10 days, absences from occupational diseases and accidents account for only one day. This clearly indicates that ordinary maladies on a community nature are responsible for more than 15 times as much absenteeism as trade hazards or other in-plant causes. THE ROLE OF PHYSICAL EXAMINATION: Physical examinations in industry benefit both the worker and his employer. There are very few diseases whose severity cannot be cut by early diagnosis and its concomittant, early treatment. Contagion can be curbed and controlled by examination, and it is—just as it could be within the community itself. The continuing need for physical examination and industrial job-checking is growing daily. It will be a "must" on the nation's economic and social schedule for returning servicemen. Industry intends to assume its full obligations to the men who left it for war and for the thousands who never before held a job within the industrial community. And this can only be done by judging the physical and mental limitations surrounding its jobs. There will be cases of disability and mental disorder that can only be solved by careful examinations and changed work processes based on examinations. Many companies, recognizing this fact clearly, are using physical examinations to assist them in designing special machinery to compensate for possible disabilities. In all cases, general health must be the starting point for any in-plant program along these lines. PSYCHONEUROSIS: Estimates of the first million men discharged from the Armed Forces indicate that 300,000 of them had some form of PN. Naturally, this condition will have a direct influence on employment factors for the future. This is a highly complex society. Civilization is charged with making more "psychos" than war. Whether this is true or not has not been definitely determined. But contrary to any pessimistic estimates, industry in general has a place for most PN's. Where it lacks those places, medical science through industrial health programs, is creating them. NUTRITION PROGRAM VITAL: Many of the ills revealed through examinations can be easily remedied through proper diet, many more alleviated. Reasonably competent estimates indicate that approximately 100,000,000 out of our 137,000,000 may be "ill fed." Industry in general recognized this problem and incorporated its solution in many in-plant food programs. The War Food Administration recently conducted a survey which showed 90 percent of all factories employing 2500 persons or over were providing eating facilities and well balanced meals. In March of this year some 6,200,000 in manufacturing industry were making regular use of such facilities. This sort of an industrial starter might well indicate what an over-all national program conducted by the U. S. Public Health Service through state and local offices could do to establish nutritional habits in all types of businesses, and throughout the community. The same sort of statistics which accompany any well-rounded industrial program also accompany the nutritional phases. Accidents were cut 30% in an electrical plant with the serving of basic food snacks between regular meals. Production increased 8% while errors were cut 4% in another plant

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Industrial physicians are invited to send for clinical test sample, a complimentary copy of the new, comprehensive and profusely illustrated brochure on tar therapy, and the details of "Tarbonis Planned Procedure" in the control of occupational dermatoses. THE TARBONIS COMPANY, 4300 Euclid Ave., Cleveland 3, Ohio.

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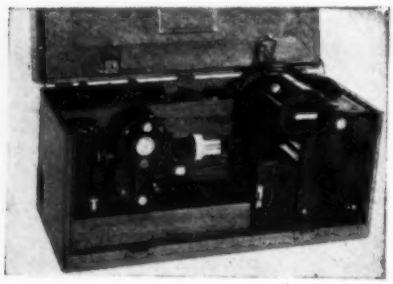
The doctor who selects a Cambridge Electrocardiograph will always be proud and satisfied with his choice, not only today and tomorrow, but for the remainder of his days of practice. The *Cambridge* is a lifetime instrument.



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where milk and fruit were served between meals. An Alabama milling firm reported a 10% production increase due to a nutritional program. Still another company revealed a 30% decrease in accidents after its 1500 employees have been given free milk and a five-minute recess over a period of time. INDUSTRY HAS POINTED THE WAY: What industry has done in the interests of employee health can be extended throughout the nation in many ways. The merits of a related program are obvious. There are areas where new facilities are needed badly, new hospitals and certainly more doctors, especially at this time. But well ahead of any expenditures for physical facilities should come an educational program designed to acquaint more of our people with what constitutes good health. Good health like most of our other problems has an economic root. If we restore and maintain national economic well-being, we shall go a long way to rejuvenating physical well-being. Until then, medicine and progress might well remain thwarted. Industry has illustrated what can be done, and what is being done. Those things must be translated to the family level in all sections of the land.

MORRIS RASKIN, M.D., Medical Coordinator, Health Institute of the United Auto Workers, CIO: The sharply increased work-week and general intensification of labor and the waiving of vacations during the war have resulted in an increased incidence and severity of illness. The effect of the increased work-week has been especially severe on the woman worker and the new industrial worker, as well as on the workers over 50 years of age who are working 50 to 70 hours per week under rigorous physical conditions during a period of sharp war-time anxiety. The fatigue factors involved in this general situation are leading to an increase in industrial accidents and susceptibility to industrial as well as non-industrial illnesses. Our experience has shown that emotional factors are leading to extreme nervousness, gastro-intestinal disorders and varying degrees of hysteria, the effects of which will remain with us long after the war is over. Pregnant women in some of the large plants, subject to firing on discovery of pregnancy, often conceal their condition because of financial necessity for continuing at work. Concealment of pregnancy often leads to a dangerous situation because women workers may continue at jobs dangerous to their condition. These firings occur despite the fact that all government agencies, as well as the Wayne County Medical Society, have stated that pregnant women under care of physicians can continue at work, if placed at proper work. A plant employing over 20,000 during a program of mass x-ray studies fired workers with healed tuberculosis. This was done at a time of acute manpower shortage. The medical profession agrees that workers with healed tuberculosis provide no hazard and can continue at most types of employment. During the course of this study active cases were found but because no arrangements were made to care for these cases and to provide for security for the family during the period of treatment, these people for the most part returned to their former state of residence, becoming foci for spread of the disease. In addition, it is agreed that in a prolonged war such as we are now engaged in, the work-week in excess of 54 hours increases illness, absenteeism, and accident rates and does not appreciably increase production. Brief furloughs from work are also advised. Factory facilities which were geared to handle a small peacetime working force, have not sufficiently increased facilities to handle present greatly increased personnel. Proper plant feeding facilities have long been recognized by government agencies and by nutrition experts as necessary for the maintenance of health and as essential for continued production. Yet in-plant feeding facilities in the Detroit area are glaringly inadequate. One plant employing over 10,000 has no full-time doctor to care for the injured. In this plant and similar ones there is an increased tendency for non-medical personnel, such as first aid attendants and nurses, to perform such delicate medical procedures

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as splinting of fractures, opening of abscesses, suturing wounds, treating skin disease, and removing imbedded foreign bodies from the eyes.

LEVERETT D. BRISTOL, M.D., Chairman, Health Advisory Council U. S. Chamber of Commerce: INDUSTRIAL HEALTH: The national health survey probably is fairly indicative of conditions today. This survey made a conservative estimate of an annual loss of a billion days from usual pursuits caused by illness. Six million people in the nation, according to this survey, were absent from work because of illness each winter day and 23 million people were chronically ill, impaired or defective. It is impossible to estimate accurately the tangible and intangible costs in dollars, in human suffering, want and economic dislocation, resulting from this lost time but it has been conservatively estimated that this cost would approximate at least 10 billion dollars for the nation, including loss of production and plant dislocation, medical costs, hospitalization, relief and social services and other individual and community factors. Absenteeism from illness and accident measurably increased during 1943, due principally to the employment of older and younger people and those untrained and unconditioned for the pressure of war production. Absenteeism credited to illness now averages nine days for men and almost 12 days for women. With the current shortage of manpower and coming postwar competition, this illness is a serious drain on the productive capacity of the nation. It is important to realize that while plant hygiene and medical supervision of the worker is essential, about nine-tenths of worker illness comes from causes outside the plant. Industrial health, therefore, means community health and home health and the industrial program is not complete unless it includes an impact on conditions outside the plant. The medical services of many plants reach into the home with educational material and health programs, particularly in the field of preventive medicine and in nutrition. Industrial medicine of the future must place more and more emphasis on prevention; we should think in positive terms of industrial health. The "company surgeon" undoubtedly will still have a function to perform, in view of accidental injuries and compensation problems, but "next steps" should involve the more active direction of industrial health programs by physicians well trained in health and preventive medicine, with the assistance of industrial engineers, psychologists, nurses, nutritionists and other personnel that may be required. Mere defensive attention to occupational disease must give way to the active promotion of occupational health. The prevention of tuberculosis and syphilis and of various types of emotional maladjustment and actual mental disease must become as active in the industrial health program as in the public health program in general; and much of the same methods of case-finding and control should be inaugurated in cooperation with community authorities. A few of the fundamental objectives in a coordinated program should be: (a) To stimulate the evaluation of important hazards to health and safety and to make specific and practical recommendations to the managements for the elimination of any hazards encountered. (b) To develop community-wide interpretation and local medical education on industrial health. (c) To make provision for at least minimum medical services in all industries including (1) physical examinations, (2) a well-organized system of referral for the correction of physical defects to be worked out with the cooperation of the medical profession and community hospitals, and (3) an adequate system of records and reports. (d) To inaugurate specific contacts with local managements and workers and to assist in providing material and personnel where needed. In order to implement such a program, it is suggested that joint coordinating commissions or boards at national, state and local levels be set up to include one representative from each of the following groups: (1) employees; (2) organized labor; (3) industrial management; (4) Chamber of Commerce; (5) medical society; (6) dental society; (7) nursing association; (8) hospital association; (9) health department; (10) safety council; and (11) educational institutions. Additional funds or personnel which may be required should be sought from available local, state and Federal sources. PREVENTIVE MEDICINE AND PUBLIC HEALTH IN GENERAL: The fact

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In Oravax group, 3.7 days lost per person per cold; in control group, 6.75 days. *Canad. M. A. J.* 41: 493 (1939)

Oravax 85% to 90% effective against loss of time. *Indust. Med.* 8: 350-1 (1939)

70.2% of Oravax group free from colds; 7.2% of placebo group. *Indust. Med.* 9: 530-3 (1940)

Incidence of severe colds in Oravax group 1/5 that in placebo group; duration of severe colds 0.6 day in Oravax group, 3.4 days in control group. *Journal-Lancet* 60: 319-24 (1940)

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that one-third of the men examined for military service are found to have physical or mental defects, points to the need for well-planned, better coordinated and adequately financed community efforts in the fields of preventive medicine and public health. The dividing line between curative and preventive medicine in the future should be less and less evident; the so-called healing art should become decreasingly pathologic and increasingly physiologic; the clinician and the hygienist should take up arms together in a common cause wherein voluntary and government efforts are more adequately interlocked. Just as each doctor's office should become a health center for the private practice of preventive medicine, so also his office at least in part should become a branch office of the local health department. Only in this way will the public health obstacles of the present and future be overcome. The control of pneumonia, syphilis, mental disease and various other disorders await the more active partnership of private doctor and public health officer. Not until the practicing physician assumes as much obligation and responsibility to the public as he does to his private patient will these problems, which are now pressing for solution, be solved. In the interest of the better and more complete health and medical care of all the people, the gap in the organized care of the sick must further be closed; the best way to meet the need is for practicing physicians and health authorities to approach one another on the common ground of an active, coordinated program with the financial backing of the public, where necessary. Such a coordinated program should include (a) further development of health centers, under public auspices, for carrying on health department activities required by law, including an expanded program of health education, and (b) the further development of medical treatment centers in connection with hospitals and their outpatient departments. City health administration of the future must become more and more decentralized, with the development of neighborhood health districts and full-time district medical officers. While city health administrative units of the future should be contracted and increased in number, rural health units must be expanded and decreased in number. No one pattern for rural health administration seems practicable and feasible for all sections of the United States. The one thing which is evident is that the small town, isolated, part-time, underfinanced local health department, without trained leadership, is entirely out of date, and in many communities there is urgent need for a new model. MEDICAL AND HOSPITAL CARE: What is needed in the fields of medical and hospital care is not "socialized medicine" or "state medicine" but *better organized* medicine which is so well organized that while it remains largely in the hands of individual or groups of private practitioners, it will reach rich and poor, city folk and country folk, children and adults, employed and unemployed, not only after disease has gained a foot-hold, but before disease has become apparent, and while the individual still is well and strong. More community-wide efforts, through adequate local planning agencies, also should be directed toward the coordination and improvement of hospital and other services in relation to community needs. Hospitalization on the periodic prepayment or insurance plan is now in operation in various states and cities and a further extension of such voluntary programs may be anticipated. Voluntary prepayment plans covering medical and surgical services, either separate or in connection with hospitalization plans, should be given a thorough trial. Further encouragement and financial support should be given to our voluntary hospitals operated by church organizations and non-profit associations. In the United States there is room for both government and voluntary institutions. In any program for the medical and hospital care of returning war veterans, the services of private practitioners of medicine and voluntary hospitals should be included in the scheme of things.

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—*Industrial Hygiene News Letter.*

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COMMENT and OPINION

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—DR. FRED C. WIEGMAN, President Midland College, Fremont, Nebraska, in *Hospital Topics & Buyer*, September, 1944.

Well, Well

MAKING it official, the Office of Defense Transportation stated flatly today: "There are a few basic differences between men and women. Women are not just 'small men,'" ODT explained in a bulletin entitled "Practical hints to employers of women with special reference to transportation." For any employer who hadn't noticed, the publication elucidated: "The average woman differs from the average man in certain physical, psychological and experience factors which have a direct bearing upon her ability to learn and to perform certain jobs." There are 15 special points of difference between the sexes which must be considered from an employment standpoint, the bureau decided. For instance: "The elbow and the knee are constructed differently in women. This partially accounts for their tendency to grasp tools differently from men and to be less steady on their feet." Plunging boldly into generalizations on woman's psychology, ODT advised that "everything she says should not be taken seriously." The bulletin advises women to wear long underwear when working outdoors in winter, not to expect continual praise, to behave in a businesslike manner and to observe safety rules. Oh, yes, and one last thing: "Lift with your mouth open."

—*News item.*

Why She Quits

THE reasons why women voluntarily quite their jobs are not mysterious unknowns. Some of them are old and long familiar in industrial circles, others are peculiar to wartime conditions. The woman worker quits today, as she did yesterday, because she is sick. She quits to get married, to join her husband when he is moved; or to stay home with her children. As early as the spring of 1943 these "marital, home, and allied causes" were the major reasons why women voluntarily quit their jobs in 42 war industry plants located in 17 states and employing approximately 70,000 women. Labor turnover rates for women usually are highest in the first month of employment. It is in the first weeks that a woman decides she doesn't like the job, that it is disappointing or unsuitable. Later she has other problems on the job—there is no chance for promotion, the job doesn't pay enough, or her supervisor expects her to do things without telling her how. Turnover rates in the first month of employment are high for men also, but they have been particularly high for women during the war period because of the many new entrants to the labor market. To the women taking jobs outside their homes for the first time, the factory is strange, unknown, and they have little idea of what they are getting into. More than three million of the 6,650,000 new entrants to the labor force between December, 1941, and March, 1944, were married women with homes to maintain and families to care for. This means that, in addition to their problems of adjustment to the new job, these married women have had the problem of making the necessary adjustment in home duties.

—Women's Bureau, U. S. Dept. of Labor.

Veteran Therapy

PRACTICALLY every wounded serviceman added to our payroll brings us new problem in rehabilitation. We are constantly adding to the number of servicemen now returning to industry and many of them require special treatment to improve their physical condition to make them productive members of our highly industrialized society. We are as vitally concerned about the human product we are turning out for peace as in the war products we manufacture to hasten that peace. From our experience with these servicemen, come valuable lessons which we can apply to industrial accidents. Our physical therapy department is developing special equipment for baths and exercises which have been found beneficial. Lights, massages, and heat have their respective roles to play in the further recovery of the discharged fighter.

—DR. EDWIN H. MCILVAIN, Medical Director, Edward G. Budd Manufacturing Company, in *Occupational Hazards*, October, 1944.

Eyes

FROM the Educational Committee of the Board of Trustees of the Medical Society of the State of Pennsylvania, of which the Luzerne County Medical Society is a component: "Of all industrial accidents, 17% involve the eye . . . 15% of the blind in the United States lost their sight because of industrial occupational accidents. . . . There are more than 300,000 eye accidents in this country every year. . . . Flying particles cause a great many industrial eye accidents. These particles may be metal, stone, wood, glass, dust or emery. . . . Burns with acid, alkali, heat lime, or molten metal are frequent causes of eye accidents. . . . The use of goggles is insisted

upon by safety directors where there is danger of accidents to eyes. . . . Guards and shields are protective measures in use. . . . Despite warnings and precautionary equipment there are more eyes lost in industrial accidents than hands, arms, feet, and legs combined. Accidental injuries to human eyes cost the Nation more than $50,000,000 a year. Most of these are definitely preventable."

—*Nanticoke Press*, October 5, 1944.

He'd Paid for It

LAST winter I was called in to attend a man suffering with influenza. I suggested that since he was employed by the Southern Pacific Railroad he apply for free hospitalization and care under the company sickness plan. A call to the company physician confirmed the fact that the patient was eligible. The latter declined, however, to go to the hospital and asked me instead for a prescription. I called at the patient's home in a few days and found him drying dishes. Months later he came to my office and asked me to fill out insurance papers covering seven weeks' illness. He could have got well in a week at the hospital and returned to his war job—but since he had paid for his insurance he wanted to collect.

—THOMAS R. PRATT, M.D., Prisino Beach, California, in *Medical Economics*, October, 1944.

Showing Us the Door

IT IS now plain to all that industrial health is not a social project, nor even a public health project: it is an enterprise of industry and medicine, says the editor in the issue of INDUSTRIAL MEDICINE that carries a fine symposium on the employment of the sub-standard worker. (Who Can Work? M. M. SHAFER, *et al. Indust. Med.*, 13:7, 531, July, 1944). Any public hygienist who refuses to have the door editorially slammed in his face will find the papers useful. Heart cases, neuropsychiatric workers, the maimed, and those with defective eyes and ears are the objects of consideration.

—From "A Selected Public Health Bibliography, with Annotations," RAYMOND S. PATTERSON, PH.D., in *American Journal of Public Health*, October, 1944.

Tuberculosis

THE workingman is greatly interested in health; particularly as it applies to himself, his family, and his community. But to him health is more than freedom from disease; it is also freedom from want and insecurity. Tuberculosis is one of his strongest and most heartless enemies. It is a foe that endangers family, cuts earning power, and destroys fair dreams. He knows all this, and he knows there also will be poor provision for the remainder of his family and inadequate rehabilitation—if any. If, when disease is discovered, his treatment is sympathetic, the welfare of his family protected, an interest in his re-

50%

REDUCTION IN DERMATITIS

CASES REPORTED IN 90 DAYS*

**According to a report covering a group of 10,000 workers, over a period of three months. The use of ELEVEN THIRTY-TWO Protective Cream and Foaming Oil Cleanser aided in reducing the number of cases from a high of 50 moderately severe and severe cases a month to a maximum of 25 cases.*

Preventing known irritants, such as cutting oils, grease, solvents, inks, and other materials from defatting action of the skin is the curb for dermatitis. Keep irritants from penetrating the skin, and avoid cleansers that contribute to dry skins. A proved, effective method employed in the case cited above includes:

(1) Apply ELEVEN THIRTY-TWO Protective Cream before starting work to hands and all exposed parts of the body. This cream resists water-soluble irritants, yet may be readily removed along with impurities by washing. There is no "secret" formula involved. It is a protective compound of *lanolin base*–in sufficient quantity to do a thorough job.

(2) Cleansing is done with FOAMING OIL SKIN CLEANSER, a sulphonated *vegetable* oil mixed with a wetting agent. It is an efficient cleansing compound that will not defat the skin–rather, it provides additional beneficial oils for the skin to help build up resistance to drying or chapping both on and off the job.

A GUARANTEE—based on your experience. Best proof of the value of these dermatitis preventives is your own experience. You can get this experience at no cost by using the Kolar Laboratories' *trial offer*. We will ship prepaid six one-pound jars of ELEVEN THIRTY-TWO Protective Cream, and (one gallon) of Foaming Oil Cleanser invoicing in the regular manner, but with the distinct understanding that this invoice is not to be paid unless the preparations measure up to your expectations in every way.

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BY PROTECTING AND CLEANSING THE SKIN

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The Test of Time
In marked contrast to many short-lived therapies, Pineoleum has retained its reputation for more than 40 years as a reliable agent for the symptomatic relief of the common cold. Recent research* has confirmed its clinical safety. ¶ Pineoleum Spray or Drops effectively promote ventilation and drainage through satisfactory vasoconstriction – free from the excessive action of some ephedrine preparations. At the same time it exerts a desirable palliative action on the irritated, inflamed nasal mucosa. Applied early, Pineoleum may help to abort an attack; later it may reduce disability, and aid in furthering the recuperative process. ¶ Most significant of all, Pineoleum (unlike many aqueous solutions) forms a soothing film on the nasal mucosa, and so protects while it relieves.
FORMULA: Pineoleum contains camphor (.50%), menthol (.50%), eucalyptus oil (.56%), pine needle oil (1.00%), and cassia oil (.07%), in base of doubly-refined liquid petrolatum – plain or with ephedrine (.50%).
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Protects while it relieves
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*Griesman, B. L.: Arch. Otolaryng., 39:134, 1944. (Abst. J.A.M.A., 125:173 (May 13) 1944; Quart. Rev. Otorhin. & Bron.-Esoph., 3:202, (June) 1944). Novak, F. J. Jr.: Arch. Otolaryng., 38:341, 1943.
THE PINEOLEUM COMPANY, NEW YORK 4, N. Y.

turn to work shown by word and deed, and, above all, a job saved for him, he will not actively resist physical examination with a chest x-ray. Only rarely does he find himself in such an ideal situation.

—DR. W. A. SAWYER, in *New York State J. Med.*, quoted in *Tuberculosis Clip Sheet.*

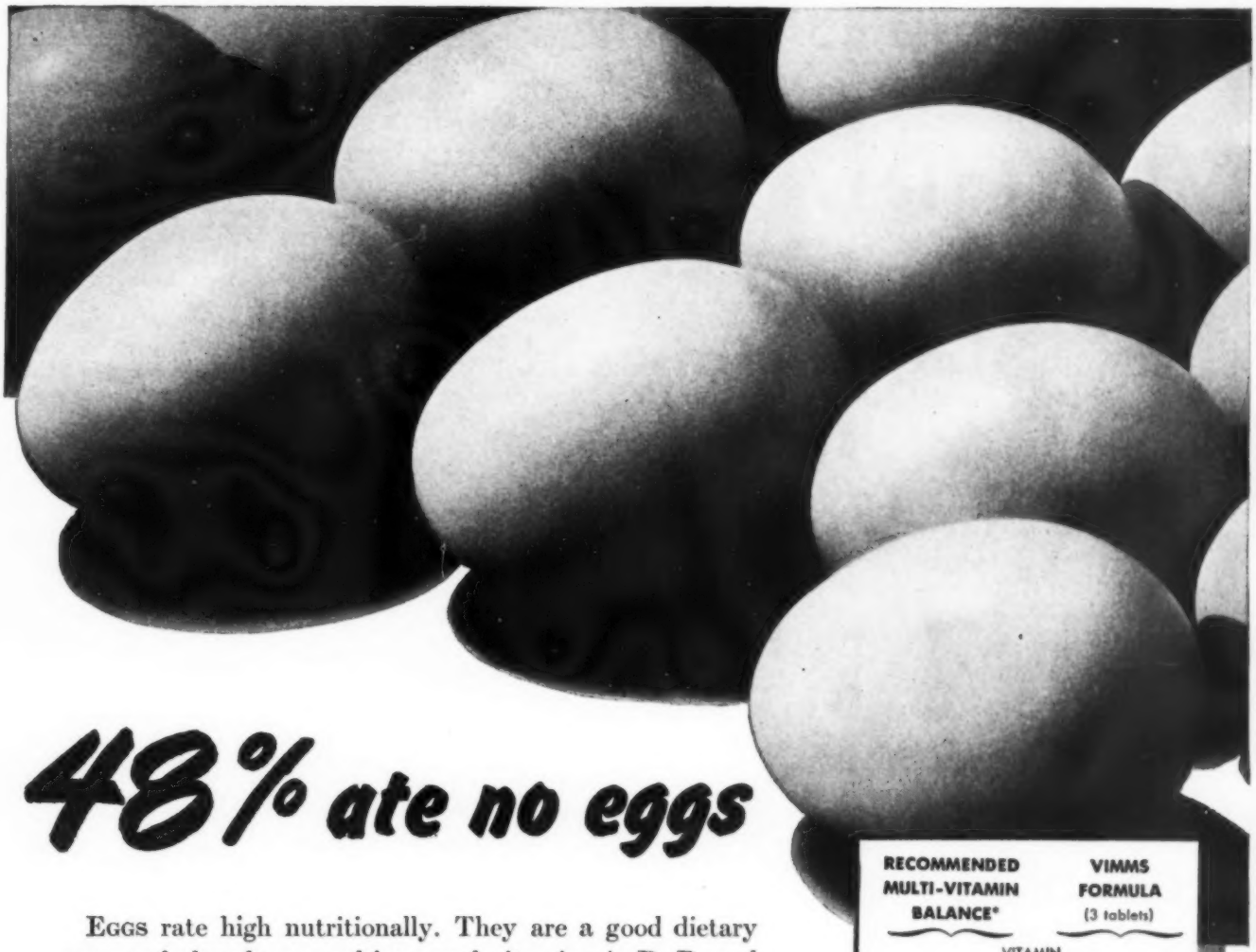
"See Here, Private Enterprise"

IT DOESN'T take a crystal ball to reveal the fact that thousands of our returning veterans are already saying, "See here, private enterprise! Where's my job? And what's lined up for my future?" Answers are arising from all quarters of the nation. But as the old minister told his congregation, everybody talking about heaven ain't goin' there. And everybody talking about jobs for veterans doesn't have jobs to give. Businessmen do. The productive jobs our fighting men want come from the same sources they always came from, industry and business, the farms, the activating economic forces. The task of providing the right answers belongs to top management. The best personnel and labor relations men in the world cannot handle the problems involved without the complete and careful authority and interest of the executives who fill the presidential chairs in industry. If business management fails this opportunity, then government will grasp it and the creeping collectivism already seeded within our land will no longer creep. It will stand erect and walk. The return of veterans to productive work is a job for top management for still another reason. There are many industries able and big enough to create special new departments for rehabilitation work or expand old ones to cope with their problems. Those industries have veteran plans in operation even now. But some 70% of all the labor employed by manufacturing industry is employed in plants with less than 500 workers, the smaller enterprises which comprise the bulk of America's industrial community. Many of these firms are not in a position to set up elaborate departments or to employ specialists for their transition problems. Yet so far as manufacturing industry is concerned, they will in the aggregate re-absorb the majority of our returning servicemen. In these plants top management must assume the responsibility and understand every phase of whatever program is established. I need not remind you of the infinite variety of problems that are involved. Readjustment is never easy. The mechanical business complexities connected with reconversion while they present innumerable difficulties can never rival the dizzying trail of human problems that will be ever present. Not all the scars of war are on the surface. The obvious disabilities will be more than matched by unseen mental quirks bred by combat stresses and mere Army life alone. There will be new talents and skills in men who previously lacked them. There will be maturity where there was youth alone before. I believe that business will be richer and wiser for all the changes it must meet once the transitional period is ended for in our returning veterans the nation re-gains its finest talent. There will be many surprises until that fact is fully appreciated. The 20 year old youngster who was once head messenger boy in an office or plant has returned a lieutenant colonel from the air force. War has proved his leadership and ability faster than normal business channels ever could. But can that man return to a messenger's job? Will he want to? What is industry's obligation to him? Is it merely the return of his old job?

—From "Industry Welcomes Back Its Veterans," address by HARRY L. DERBY, President, American Cyanamid & Chemical Corporation, at N.A.M. Institute on Industrial Relations, Atlantic City, September 12.

Colonel Lanza

A PREDICTION that industrial medicine and hygiene will be one of the principal fields of preventive medicine in the next generation was made today (October 6) by COLONEL A. J. LANZA, director of the Surgeon General's occupational health division office in the War Department. Achievements in this field during the war have been so successful that industry, it is felt, will continue its current search for more and more scientific information for the protection of the health of its employee personnel, COLONEL LANZA said in citing the record of the War Department. "When the war started and the Army rapidly expanded its industrial plants from a few arsenals, some of which dated back to the Revolutionary War, to large numbers of enterprises including ordnance works, chemical warfare plants, quartermaster depots, air



48% ate no eggs

EGGS rate high nutritionally. They are a good dietary source of phosphorus and iron, and vitamins A, D, B_1 and B_2. The Bureau of Home Economics lists them among the "Basic 7" foods. Yet a nation-wide survey showed that 48% of those interviewed ate no eggs.[1]

In the face of such poor dietary practices among patients, many doctors, to effect dietary improvement quickly, will frequently recommend that extra vitamins and minerals be taken daily. The Vimms formula (3 tablets) supplies the full minimum daily requirements for *all* the vitamins known to be essential in the diet, and significant quantities of the important minerals, iron, calcium and phosphorus, as well.

[1] *Journal of the American Medical Association, February 27, 1943.*

RECOMMENDED MULTI-VITAMIN BALANCE*	VITAMIN	VIMMS FORMULA (3 tablets)
4,000 USP Units	A	5,000 USP Units
1 mg.	B_1	1 mg.
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10 mg.	Niacin	10 mg.

In addition, Vimms supply the minerals most frequently deficient in the average diet.

CALCIUM..... 375 mg.
PHOSPHORUS..... 250 mg.
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*Journal of the A.M.A., July 18, 1942, pp. 948-9

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bases and sub-depots, the War Department set up a uniform policy of industrial medical service in the office of the Surgeon General," he said. The responsibility of the Army as an employer was no different from that of a private concern. It has to see that employees are adapted to the job; that emergency service is available to those who become ill or injured while on duty; that working conditions are healthful, and that toxic conditions are controlled. "To that end trained industrial physicians, men who had been working in industry, were commissioned and assigned to the Army industrial plants, and their services were supplemented by contract surgeons employed on a Civil Service basis." The War Department also established an experimental industrial hygiene laboratory at Johns Hopkins University School of Hygiene and Public Health in Baltimore. Plants of the War Department employ about 850,000 civilians, all of whom have the advantages of the industrial health service. In addition, Army contract plants employ another 1,500,000 workers. Notable advances, worked out in the plants with the cooperation of the Baltimore laboratory, have been on these two fronts: (1) medical engineering control, which betters working conditions for all by a check on environmental conditions; (2) control of toxic hazards, which protects those who must work with dangerous material. Commenting on toxic controls, COLONEL LANZA said he was willing to guarantee that there would be no fatalities from radium paints, due to the War Department booklet: "Radioactive Luminous Compounds — Protective Measures." He said that the principal trouble in plants due to toxic substances is skin irritations, which often are allergies and give no trouble once the worker has built up a resistance and become desensitized. In cases where the sensitivity persists, a change of work is made. Examination for tuberculosis by the small film x-ray method also is now considered routine in pre-placement examinations.

—*New York Times*, October 7, 1944.

The Wages of Red Tape

A NEW kind of corporation report has made its appearance. The president of Johns-Manville Corp. in a letter to his stockholders states that in 1943 his company prepared and filed with various divisions of the government 71,588 reports and questionnaires—one every two minutes during regular business hours throughout the year. Indicating the rapid gains of paper productivity induced by New Deal regimentation, the report shows that the output of reports and questionnaires rose from 27,198 in 1942—an increase of 250% in one year. All hopes that the questionnaire industry could solve the postwar employment problem must be dismissed, however. The deadly efficiency engineers have begun to kill jobs in that field already. Output per man-hour is going up. In 1943 Johns-Manville devoted only 97,452 man-hours to making 71,588 reports, compared to 132,560 man-hours required to turn out 27,198 in 1942. Nevertheless the cost of red tape to this corporation in two years amounted to 40 cents per share of common stock, also to $24 per employee. Freed of Federal regimentation the corporation could have paid every stockholder 20 cents more a year, or raised every employee's wages by $12.

—*Chicago Daily News*, Editorial.

Visual Acuity

VISUAL acuity, when measured in individuals selected at random as they apply for jobs, with or without glasses, may vary greatly at different distances. Therefore, it is often the case that the employer never finds out exactly how acute his employees' vision is for the distance at which these men are hired to work. For example, a prospective employee (who is 50 years of age) has a pair of glasses for reading, which means correction has been furnished for normal reading distance of fourteen to sixteen inches. His distance and reading visual acuity is then measured and recorded in each eye, singly; but the man is put on a job, the work distance of which is thirty to forty inches and which requires the use of both eyes simultaneously. Instances like this one, multipled many times, yield results which, when lumped together, may distort any analysis of job performance, safety, and visual acuity. It is the responsibility of the professional services to provide correction lenses, prisms, exercises, etc., for the work distance; and to measure acuity specifically for the employee's particular job. But it is industry's responsibility to take this factor into account when conducting surveys and making analyses of safety and

A decade of Vitamin Leadership

For a decade—since 1934, when Ascorbic Acid was synthesized—the name Merck has been identified with leadership in the synthesis, development, and large-scale production of pure vitamins.

The following list of contributions in the vitamin field made by Merck chemists and their collaborators emphasizes the outstanding rôle played by Merck & Co., Inc. in the development of these vitally important substances.

1934

Ascorbic Acid Merck (U.S.P.) was made available by Merck & Co., Inc.

1936

Vitamin B_1 was synthesized in the Merck Research Laboratories.

1937

Thiamine Hydrochloride Merck (U.S.P.) was made available in commercial quantities.

1938

Nicotinic Acid Merck (U.S.P.) (Niacin) and Nicotinamide Merck (U.S.P.) (Niacinamide) were made commercially available.

1938

Riboflavin Merck (U.S.P.) was the second pure crystalline vitamin to reach commercial production during that year.

1938

Alpha-Tocopherol (Vitamin E) was identified and synthesized by Merck chemists and their collaborators in other laboratories.

1939

Vitamin B_6 was synthesized in the Merck Research Laboratories.

1940

Vitamin B_6 Hydrochloride Merck (Pyridoxine Hydrochloride) became available in commercial quantities.

1940

Alpha-Tocopherol Merck (Vitamin E) was made commercially available.

1940

Vitamin K_1 Merck (2-Methyl-3-Phytyl-1,4-Naphthoquinone) was made commercially available.

1940

Menadione Merck (U.S.P.) (2-Methyl-1,4-Naphthoquinone), a pure chemical having marked Vitamin K activity, became available in commercial quantities.

1940

Pantothenic Acid, member of the Vitamin B-Complex, was identified and synthesized by Merck chemists and their collaborators in other laboratories.

1940

Calcium Pantothenate Dextrorotatory, a biologically active form of Pantothenic Acid, was made commercially available by Merck & Co., Inc.

1943

Biotin, member of the Vitamin B-Complex, was synthesized in the Merck Research Laboratories.

1944

Biotin Merck was made commercially available by Merck & Co., Inc.

Merck & Co., Inc. now manufactures all the vitamins commercially available in pure form, with the exception of vitamins A and D.

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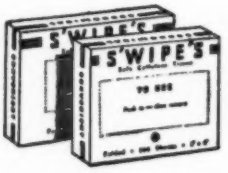

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Cellulose Tissues, absorbent, disposable. For use as Mouth, Ether or Sputum Wipes.

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of visual acuity. It is also industry's responsibility to indicate the work distance in all reports of accidents as they occur, and if possible, the acuity at this distance, if it be available. Only when such data are obtainable can any reasonable deductions be made on a quantitative basis, regarding the possible relationship between accident frequency, or rate, accident repeaters, accident proneness, and visual acuity.

—From "The Relation of Vision Testing to Safety in Industry," by JOSEPH LO-PRESTI, M.D., in *Sight-Saving Review*, Summer, 1944.

Let Them Alone

DECLARING the returning war veteran is able to make his own way in civilian life, Maj. Gen. Norman T. Kirk, surgeon general of the army, said today (October 12) that "too many plans and too many agencies are trying to tell these fellows what to do. These men aren't asking for charity or sympathy," he asserted at a New York Times forum on "The Veteran and the Community." "They don't want anybody messing in their business." Gen. Kirk's stand was backed by another speaker, Jean A. Brunner, national commander of the Veterans of Foreign Wars. In Washington, D. C., on October 4, Mrs. Anna Rosenberg, an original New Dealer of the NRA days, was reported to have given top ranking generals some advice on how to fit their men for return to civilian life. At a meeting called by Lt. Gen. Brehon Somervell, chief of the army service forces and a White House favorite, Mrs. Rosenberg was said to have told the generals the soldiers overseas are unfitted to resume their normal lives when they return and urged that they be given reorientation courses before being released. Her theory was advanced after she had spent 17 days in France.

—*Chicago Tribune*, September 13, 1944.

The "Under-Dog" Psychology

WE MUST remember that it is to the advantage of unscrupulous labor bosses to keep the public believing that all industrial relations are bad, and that management is habitually against the best interests of the working man. Creation of the "underdog" psychology for the workers' cause is bread and meat to the labor dictators. It's sure fire too. America is a sucker for the "underdog." His sufferings are the chief stock in trade for the haranguers, demagogues, misleaders and some politicians who maintain their sway by posing as the champions of the downtrodden. I am glad America is like that because it shows the unselfishness characteristic of Americans. But it can be almost criminal blindness if management, through bad labor practices, lends fuel to this public build-up of the "underdog" psychology for labor. So valuable is this "underdog" atmosphere to the coffers of misguided unions that most of the labor press of this country keeps the ranks of labor continually riled up with untruthful, distorted and inimical picturing of management as the enemy of society. Every sin is a "capital offense" to the labor press. In the face of such smearings it's a wonder sensible labor keeps its feet as well as it does. This editorial policy of some of the nation's labor press to plant distrust and suspicion of management far beyond any justification in fact, is one of the most disservices to our national progress.

—From "Administering Labor Relations in a Fish Bowl," address by WALTER B. WEISENBURGER, Executive Vice-President, N.A.M., at Institute on Industrial Relations, Atlantic City, September 13.

Adjusting the Disabled

AT THE Fifth Annual Congress on Industrial Health, Chicago, 1943, it was stated that industrial surgeons should use their influence with management to establish a more scientific method of placing workers in industrial plants, and a more receptive attitude toward the employment of the handicapped, using proper rehabilitative procedures. This was coupled with the proposal that the medical profession, the workmen's compensation agencies and rehabilitation officials, appoint committees to get together on a program in respect to the problems

Now Council Accepted

STAPHYLOCOCCUS Toxoid-Vaccine VATOX

Available in 6 cc. vials for subcutaneous or intramuscular injections.

THE mental sequelae of adolescent dermatoses are often more serious than the purely physical aspects—but the cure of the former depends on eliminating the infection. Effective treatment will be welcomed by every physician.

Clinical investigations* and experience in daily practice have shown the simultaneous administration of staphylococcus vaccine and toxoid to be more resultful in the treatment of staphylococcal infections than when either is used alone.

STAPHYLOCOCCUS TOXOID-VACCINE VATOX "NATIONAL" is a combination of staphylococcus vaccine (Staphylococcus aureus—2,000 million per cc.) and staphylococcus toxoid (1,000 original M.N.D. per cc.) which stimulates the production of anti-bacterial and antitoxic substances.

INDICATIONS: For staphylococcal infections, particularly carbuncles, acne, furunculosis, osteomyelitis, and infectious eczematoid dermatitis. The National Drug Co., Dept. G. Philadelphia 44, Pa.

*Etris, S., J. Immun. 46:309 (May) 1943; Faust, F. B., and Etris, S., J. Immun. 46:315 (May) 1943; Goodman, M. H., Arch. Derm. & Syph. 47:640 (May) 1943; Jordan, C. B., Urol. & Cut. Rev. 47:185 (March) 1943.

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in which we have a common interest. That proposal would seem to be just as logical in California as on the national level. For our part we offer our cooperation and every assistance we can give to such a movement. In a recent article, John Bart Lauricella, M. D., President, Section of Industrial Medicine and Surgery, Pan American Medical Association, pays a tribute to Vocational Rehabilitation in summing up how that service may supplement medical treatment. He says: "It is indeed fortunate for the industrial worker, as it is also for society, that trained lay experts have been attracted to this most important field of social welfare. Without them, the job of the surgeon would be but half-done, and probably would fall far short of any real accomplishment. Without them, the painstaking efforts of the doctor might prove to be in vain. To them we owe much for the diligent manner with which they view their jobs—for their great patience with these most troublesome cases—and for their noble and painstaking efforts, perseveringly applied until a satisfactory or optimum result is obtained." (*National Rehabilitation News*, January, 1944.) We shall try to live up to Dr. Lauricella's encomium, and we place at your disposal our every aid in the common problem of occupational adjustment of the disabled.

—From "Occupational Adjustment of the Disabled," by H. D. HICKER, California Bureau of Vocational Rehabilitation, in *California & Western Med.*, September, 1944.

PEDICULOSIS

must be relieved *Quickly* among

WAR WORKERS

Early discovery, and immediate and effective control, are important in the treatment of Pediculosis among war production workers. Unless proper steps are taken, a single case of Pediculosis may lead to infestation of other employees.

Cuprex is a valuable aid to the industrial physician who bears the responsibility of having to discover and check any condition which may impair the efficiency of the workers under his care.

Cuprex therapy is simple. One treatment—of from 15 to 30 minutes—destroys the nits as well as the lice. Cuprex requires no messy or repeated applications, and the patient may return to his job without delay, and without embarrassment.

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MERCK & CO., Inc. *Manufacturing Chemists* RAHWAY, N.J.

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Dental Project

DENTAL Hygiene Institute of Chicago has completed a diagnostic project at the plant of G. D. Searle & Company at Skokie. Two hundred and three employees had full-mouth x-ray and clinical examinations, actual expenses paid by the company, the Institute providing supervision without cost. Films and charts have been sent to the dentist of the employee's own choice, providing, of course, that he is ethical. Only three advertising dentists were named (compared with 29 in another Institute diagnostic project of about the same number of employees), but in each case the employee changed to an ethical practitioner. Cards are coming back from dentists, stating that the patient has reported for his first appointment. A check-up will be made at a later date to ascertain how much of the indicated work has been completed. One dentist tells an interesting story, which is typical. A woman, a former patient, came to his office one evening last week without an appointment. He told her he would be busy all evening. "I'll wait," she said, and waited three hours until he finished his evening's appointments. "Well, doctor," she said, "I want that bridge. Start to work." "What made you come to this decision?" he asked. "Well, I work at Searle's, and we've been having dental examinations. The dentist there convinced me that I should have a bridge." "And," her dentist reported, "I've been trying for three years, unsuccessfully, to make her see the light."

—*D.H.I. News Letter*, October, 1944.

Workers' Nutrition

OPERATING with "much guidance from members of the medical profession" to improve "the general health level of workers," the Industrial Nutrition Committee of Essex and West Hudson counties (New Jersey) have reported a novel project that had improved workers' eating habits. Trained volunteers analyzed the nutritional merit of luncheon trays in war plant cafeterias where excellent food is provided at low cost. In one plant, 172 workers (30% of the total) passed a booth in the cafeteria to have their choices "flash rated." Based on a "100% tray" of milk, fresh fruit, salad, and a substantial dish, ratings of the 172 workers indicated that 11% scored 25; 28%, 50; 17%, 65; 29%, 75; 15%, 100. A trained nutritionist also made a spot check of 306 other trays on workers' tables and found that only 19% were "excellent" in that they contained over one-third of the day's needs of protective foods, vitamins, and minerals. After the tray evaluations were

One Sneeze CAN WRECK PRODUCTION SCHEDULES AS SURELY AS AN ENEMY BOMB

Put the Proved Therapeutic and Prophylactic Properties of

SHERVAC ORAL COLD VACCINE

To Work in Your Plant

Air Borne Cold Infections Multiply Man-Hour Losses

A single sneeze from the work bench or the desk of an infected person can convey the virus of the common cold to every person within the area of air circulation.

The Greatest Single Cause Of Employee Absences

There is unmistakable evidence to indicate that upper respiratory infections cause about 50% of all short time involuntary absences, and impose a yearly toll of a billion dollars and more than 45,000,000 man-days of production time.

Much Of This Loss Is Preventable

The value of mixed vaccines in prophylaxis and treatment of the common cold and its complications is beyond the experimental stage.

Controlled clinical evaluations show an impressive degree of reduction in both incidence and duration of upper respiratory infections in groups immunized by the administration of oral mixed respiratory vaccines.

SHERVAC, Oral Cold Vaccine Tablets A Practical Means For Group Immunization

Being especially packaged for convenient dispensing in a cellophane enclosure holding 12 tablets, Shervac meets all requirements for convenience in serving groups. As 12 tablets usually suffice for one immunization or one therapeutic treatment, this packet prevents waste and minimizes cost.

SHERVAC—A Sherman Product

Included in each small, tasteless Shervac tablet are both the whole and the soluble antigenic products of approximately 60,000,000,000 organisms representing: Pneumococcus; Streptococcus; B. Influenza; M. Catarrhalis; Staphylococcus Aureus and Albus; B. Friedlander; H. Influenza.

The organisms contained in Shervac are processed without the application of heat. Heat being known to affect the antigenic potency of vaccines, the Sherman process insures retention of the full antigenic potency.

Being fully detoxified, Shervac causes no gastric distress or other undesirable reaction.

Adaptable To Any Set Of Conditions In Any Plant Large Or Small

Your inquiry will bring cost figures, sample of package and suggestions for workable group immunization plans.

SHERMAN LABORATORIES
G. H. Sherman, M. D., *Founder*
BIOLOGICALS • PHARMACEUTICALS
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Please send sample packet of Shervac, with prices and suggested immunization plans.

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Right thumb shortly after accidental amputation by a buzz-saw. Metacarpal divided at its distal two-thirds.

27th day after accident and subsequent dressings with Nason's VITAGUENT (Cod Liver Oil Ointment).

A New Advance in

WOUND *and* BURN *Therapy*

Commenting on the efficacy of cod liver oil as a remarkable aid in the healing of wounded and burned tissues, Dr. Parker C. Hardin, M.D., F.A.C.S., writes*: "The cod liver oil method is . . . a complete plan whereby all possible tissue is preserved, infection minimized, granulation stimulated and healing accelerated. . . . I have found cod liver oil therapy especially applicable to extensive crushing or destructive injuries . . . to compound fractures, gunshot wounds, major primary burns, and extensive ulcerations from deep third degree burns."

Nason's VITAGUENT is a cod liver oil ointment particularly developed for this new advance in wound and burn therapy, and for sores and ulcers. Rich in natural vitamins A and D, VITAGUENT (Nason's) is not only therapeutically effective, but also free from the disagreeable odor so common to some cod liver oil ointments.

Samples of Nason's VITAGUENT will be sent on request.

**Article in the Southern Surgeon, May, 1941.*

VITAGUENT (Nason's)

TAILBY-NASON COMPANY · Kendall Square Station · Boston, Mass.

made in this plant, sales of salads increased 52%; fruit, 10%. At another plant, following similar tray appraisal, these sales increases were recorded: salads, 51%, milk, 22%; fruits, 11%; fruit juices, 23%.

—*Medical Economics*, October, 1944.

Punch Lines

EVERY now and then a writer gets off a sentence or group of sentences that carries a full message of its own—over and above its place in the context of the article in which it appears. Here are a few examples. Some readers will remember some of them, but all are pungent and stimulating enough to bear repeating: J. J. BLOOMFIELD: "It is no longer necessary in industrial hygiene to guess as to actual exposures" . . . . L. E. HAMLIN, M.D.: "One active case of tuberculosis in a group of silicotic workmen can create a situation of potential dynamite" . . . . HENRY F. SMYTH, JR., B.S., PH.D.: "There is no harmless solvent. There are simply harmless ways of using solvents" . . . T. LYLE HAZLETT, M.D.: "I regret the necessity of admitting that for the present, at least, the voluntary periodic examination is not being exploited to its fullest potentialities." ". . . . a case of more or less severe dental caries is accepted for employment. He is not, however, accepted for an insurance program until he has received dental care" . . . WILLIAM P. YANT, B.S., PH.D.: "The effect of metals or the compounds of metals may be due to the metallic component, such as lead or mercury, to the molecule of a combination with another substance or chemical radical, or to some property of the remainder of the molecule, or to a product of decomposition" . . . . JOHN R. CONOVER, M.D.: "In addition to the over-all technical viewpoint, the industrial physician must be a politician, a diplomat, a housekeeper, an accountant, an executive officer, and last, but not least, a salesman, to put it bluntly" . . . . VICTOR G. HEISER, M.D.: "The industrial physician fights this battle of health with many tools. They include medical examinations, immunization, dental care, control of communicable and occupational diseases, health education, nutrition, mental hygiene, good sanitation, safety equipment, adequate heating, lighting and ventilation" . . . . HENRY D. SAYER: "And yet common colds by the thousands are contracted by workers, and many times doubtless in the course of the employment. But who can say, with divine omniscience, that any particular cold arose out of the employment?" . . . . WINSTON CHURCHILL: "We must beware of trying to build a Society in which nobody counts for anything except a politician or an official, a Society where enterprise gains no reward, and thrift no privileges."

Industrial Nurses and Wage Law

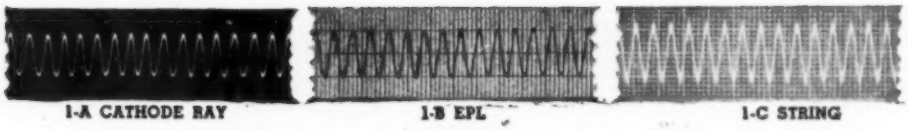
INDUSTRIAL nurses are among the border line cases to whom the Fair Labor Standards Act of 1938, also called the Wage and Hour Law may or may not apply depending on circumstances and interpretations. The provisions of the act are applicable to the large majority of the workers covered by the act but many, such as executives, administrators and professionals are exempt because of the minimum salary of $200 per month. Industrial nurses, with the possible exception of head nurses, normally would not qualify for exemption on basis of executive or administrative grounds and because of salary are not exempt as professionals. The act defines the functions and duties of each of the groups, the educational preparation necessary and draws a clear line between training for routine manual or mechanical skills and courses requiring specialized intellectual instruction and study. For the purpose of exemption the Wage and Hour Law does not regard nursing as a branch of medicine. Therefore if a nurse is to be exempt from the provisions of the act she must meet the salary test. Classification of a nurse as non-exempt, i.e., non-professional does not affect her status as a nurse but in the eyes of the Wage and Hour Law she is not considered a professional employee. The *Journal of the American Nurses Association* (May, 1944) in summarizing an article on Industrial Nursing and the Wage and Hour Law states, "If professional, i.e. exempt classification is desired for industrial nurses . . . it would be necessary to petition for a change in the existing definition of the terms 'Professional' or request a special definition for nurses." The A.N.A. will continue to study the matter and the American Association of Industrial Nurses is appointing a committee on this subject.

—*Trained Nurse & Hosp. Rev.*, September, 1944.

The New EPL

Cardiotron

A Portable, Direct-writing Electrocardiograph
giving instantaneous *standard* readings

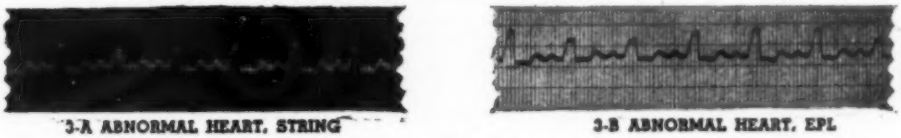


1-A CATHODE RAY 1-B EPL 1-C STRING

We state that this device makes records which resemble those made by a photographic quality string galvanometer. Actually, in the case of certain types of wave forms, the fine stylus point on the EPL machine results in a much more accurate graphic copy of the electrical wave than is possible with the string machine. This is clearly illustrated in the reproduction of the chart made by a 7-cycle sine wave on the string machine, the EPL direct-writing machine, and the inertia-less cathode-ray oscilloscope (Figures 1-A, 1-B and 1-C). It is easily observable that the string does not accurately follow the peaks of the sine waves and adds a spike at the peak of each cycle. The true graph of this wave is shown on the cathode ray tube record; and it will be seen that the EPL direct-writer makes an identical graph.

2-A CATHODE RAY 2-B EPL 2-C STRING

This characteristic is additionally demonstrated in the reproduction above which shows the record made by an artificial heart device made by three methods. It may be noted that the shape of the "T" wave is slightly slurred in the case of the string, and that the EPL graph is precisely identical to the cathode ray record.



3-A ABNORMAL HEART, STRING 3-B ABNORMAL HEART, EPL

The two figures above represent records made on an abnormal heart, subject, male aged 52, by both string and EPL methods. The EPL graph is sharp and well defined.

NOTE: The new EPL Cardiogram Report Folder facilitates examination and filing, and assures absolute protection of the records.

At present, deliveries on AA-1 priority can be made in 10 weeks. We are accepting orders for delivery in rotation as soon as priority restrictions are lifted. Light in weight . . . 27 pounds, compact in size . . . 15½" x 11½" x 8¼". $495.00.

For additional information on the EPL Cardiotron, and the EPL Electro-encephalograph and Electric Shock Machine, write to Dept. E-11

Electro-Physical Laboratories, Inc.

45 WEST 18th STREET • • • NEW YORK 11, N. Y.

a division of the ELECTRONIC CORPORATION OF AMERICA

two short cuts in URINALYSIS

Galatest
(DRY REAGENT FOR URINE SUGAR)
Time involved—30 seconds

THE NEW
Acetone Test
(DENCO)
Time involved—one minute!

Acetone Test (Denco) and its companion product Galatest are two tests which are rapidly simplifying "routine" urinalysis in doctors' offices, hospitals, and induction centers — every place where speed and accuracy are of vital importance.

Acetone Test (Denco) detects the presence or absence of acetone in urine in one minute. Color reaction is identical to that found in the violet ring tests and equally easy to differentiate. A trace of acetone turns the powder light lavender—larger amounts to dark purple. Acetone Test (Denco) is available in vials containing enough powder for over 125 complete tests, also in combination kits with Galatest.

Write for descriptive literature to The Denver Chemical Mfg. Company, 163 Varick Street, New York 13, N. Y.

Acetone Test
(DENCO)
Galatest

A carrying case containing one vial of Acetone Test (Denco) and one vial of Galatest is now available. This is very convenient for the medical bag or for the diabetic patient. The case also contains a medicine dropper and a Galatest color chart. The handy kit or refills of Acetone Test (Denco) and Galatest are obtainable at all prescription pharmacies and surgical supply houses.

THE SAME SIMPLE TECHNIQUE FOR BOTH TESTS
1. A little powder 2. A little urine *Color reaction instantly*

Accepted for advertising in the Journal of the A. M. A.

PRODUCTS OF THE DENVER CHEMICAL MFG. CO. NEW YORK 13, N.Y.

A.M.A. Council

THE broad program now under way to improve and safeguard the health of the nation's industrial workers has been outlined by Dr. W. W. Bauer, director of the A.M.A. Bureau of Health Education. In an address delivered (July 25) on a coast-to-coast radio program, Dr. Bauer emphasized that "when battle lines extend from the far corners of the earth into the remotest American hamlet where industrial production takes place, the health of the industrial worker takes equal risk with that of the fighting man. Riveter, press operator, machinist, inspector, and draftsman, not to mention executive and stenographer, are as vital to victory as machine gunner, bazooka team, ack-ack gunner, or pilot." Accordingly, the A.M.A. through its Council on Industrial Health, in addition to guiding the organization of industrial health committees in state and county medical societies throughout the country, has devoted special issues of the Association's publication to the subject. In furtherance of its purpose of improving the health of the production front, the Council also has been instrumental in introducing its study in the curriculum of medical schools and post-graduate courses for physicians. The small factory offers one of the greatest medical and health problems in industry, owing to its inability because of size to provide unaided the necessary safeguards and prompt treatment for on-the-job injuries. To assist in relieving this situation a comprehensive set of standing orders for industrial nurses working without the immediate supervision of a doctor, has been developed by the Council in accord with accepted medical practices. Of equal value as a safety measure has been the publication in pamphlet form of a procedure for industrial physical examinations classifying workers into the following groups: those fit for all work; those fit for work under periodic medical supervision with limited physical exertion, in non-hazardous work, or with special consideration for orthopedic defects, impaired vision or hearing, or psychologic handicaps; and those unfit for work at time of examination.

Healthy Feet

SIX rules for preserving healthy feet are given by Lemuel C. McGee, M.D., (Medical Director, Hercules Powder Company) Wilmington, Delaware, in an article in the September issue of *Hygeia, The Health Magazine* of the American Medical Association. Experts in care of the feet, he says, advise that the following attention is useful in preserving healthy feet: "(1) Wash the feet daily with soap and lukewarm water. Dry them thoroughly. (2) Brittle nails and callosities should be covered by lanolin or some other ointment to aid softening. (3) In the care of the nails, cleaning should be done with orangewood sticks. Cut the nails only in a good light and after a bath when the feet are clean. To avoid injury to toes, nails should be cut straight across and not too short. (4) Overlapping toes, and toes that press closely together, should be separated by lamb's wool or a similar soft material. (5) One should wear shoes of soft leather which fit properly, that is, not too tight. It is poor economy to wear ill fitting shoes when only a little more time and attention in selection will procure well fitting shoes. (6) Avoid strong, irritating antiseptics such as coal tar products." In his general discussion, Dr. McGee says: "Our pedal extremities take a beating. In a biped such as man, the two feet must do the work which is divided among four feet in a quadruped. Some special consideration would seem to be due our faithful feet.... When feet suffer they are apt not to suffer in silence. A man at rest, personifying the utmost in comfort, is pictured in his house slippers or stockinged feet, often with the feet resting on a stool or even a taller piece of furniture. . . . That the feet of women force themselves into the consciousness of their owners is shown by the scurrying and scuffling to get toes back into the proper shoes near the end of the feature picture in a darkened movie house. Thus it is evident that the lowly foot plays at least a bit part in the drama of human existence. With this justification, let us be so inelegant as to look at the foot more

Protective
CLEANSING *for* SKILLED HANDS

TO FAVOR RECOVERY in the dermatoses, replace all harsh or irritating skin detergents with ACIDOLATE* Skin Cleanser.

1. It is a water miscible non-lathering mixture of sulfated oils.
2. It contains no soap, alkali or abrasives.
3. It quickly emulsifies cutaneous soil and facilitates its thorough removal by proper rinsing with water.
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5. It leaves the skin feeling soft and cool.
6. Reports from ten clinics attest to its value.

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Specify ACIDOLATE for use wherever soap is contra-indicated. It is supplied in 8 ounce dispenser bottles and in gallons through leading drug stores.

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Skin Cleanser

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TRY SOOTHING COOLING V-E-M
FOR NASAL DISCOMFORT
CAUSED BY
STEAM HEAT, SUDDEN CHANGES IN TEMPERATURE, FUMES, DUST, SMOKE.

A spot of V-E-M in each nostril quickly and pleasantly relieves irritation in accessible nasal membranes. The soothing, cooling effect lasts for hours. Free sample to Doctors on request.

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SCLOREA: WOUNDS BURNS
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INFECTION PROPHYLAXIS

BOTH PRODUCTS CONTAIN SULFANILAMIDE SULFATHIAZOLE UREA

IN Sulfarea and Sclorea the clinician obtains two highly efficient methods of applying the sulfonamides.

Sulfarea, the ointment, is a ready-prepared surgical dressing for superficial lesions, infected burns, certain pyogenic skin infections, traumatic wounds, leg ulcers and the like.

Sclorea, the emulsoid, has the same indications with the exception of cutaneous infections, in which Sulfarea is more practical. However, as Sclorea also contains cod liver oil it may obtain quicker healing of burns, denudations and abrasions. Write for professional brochure, Dept. 4.

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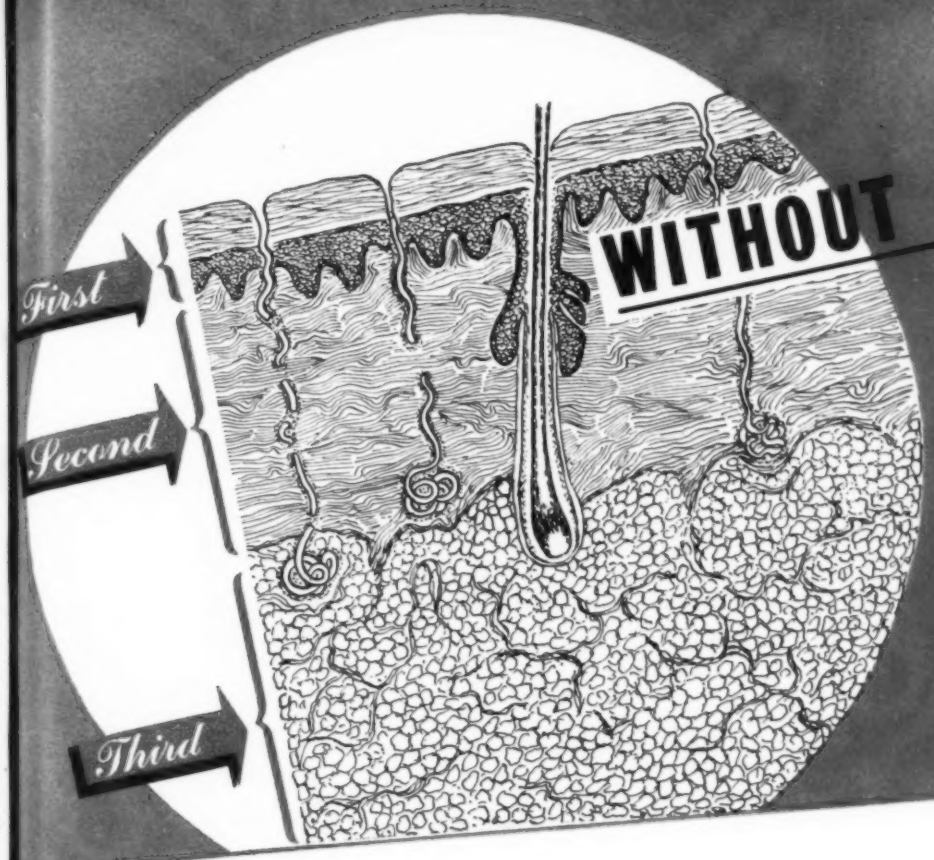
closely. Foot trouble with partial disability is common in the home and in industry. Since painful feet do not actually kill, in spite of the well known cry, 'My feet are killing me!', their discomforts have not received the careful consideration which has been accorded the complaints of other parts of our anatomy. Flat feet may be of several types and various degrees. The flattening may be of the arch extending lengthwise of the foot or of the arch extending from side to side. When the normal concavity of the foot settles downward, there is a shift in the portion of the foot which bears weight. This change in the weight-bearing surface may place a strain on weak joints between the small bones of the foot. Thus some flat feet become exquisitely painful after use—others cause little or no pain. Sometimes the great toe becomes displaced toward the outer side of the foot—that is, toward the small toe. This condition is called hallus valgus. The base of the great toe affected and the head of the bone of the foot immediately behind—the first metatarsal—project inward, becoming inflamed and knob shaped. The saclike covering of this area is irritated by rubbing against the shoe. The sac is a bursa. When inflamed, the condition is called bursitis. A shoe with sufficient breadth across the forepart of the foot helps this condition. Sometimes straps and pads are used to hold the toe in its proper position. In severe cases of surgical operation is necessary to remove projecting parts of the bones. Deformities of the toenail frequently cause a painful foot. Proper removal of a portion of the nail, including the base in the nail bed, is a surgical procedure which will control ingrowing tendencies of the nail. Painful heels may follow a prolonged illness, a change of occupation in which one must walk or stand more than one is accustomed to, or injury to a bursa or a callosity. A deficiency in the thickness of the pad of fat and the fibrous tissue protecting the heel facilitates the development of pain in that area. Sometimes the cause is growth of a spur of bone underneath the heel."

—In *Northwest Med.*, October, 1944.

Dermatologic Platitudes

WHEN one is the victim of diabetes, peptic ulcer, or diseased tonsils, his misfortune is usually his own secret possession unless he chooses to reveal his symptoms to others. On the other hand, quite frequently, he who has a skin eruption cannot readily hide his affliction and interested or ill-mannered observers comment thereon, often suggesting treatment of the condition. Given a complaisant patient, much meddlesome and damaging therapy may be accepted from those who have noted his misfortune and proffered advice. Around such a state of affairs has grown up a lengendary folklore of standard views and procedures, some of them veering far from the modern acceptation of the proper management of a case. One of these measures deals with exposure of the outbreak. "Let the sun and air get at it." How often we hear this or some other phrase of similar meaning in relationship to skin troubles—meaning, discard dressings and let the eruption dry under environmental influences. And how often we see the baneful effects of this often ill-advised form of therapy. As a sort of forlorn hope the general practitioner says it, the laity repeats it, and, sad to say, sometimes the dermatologist falls for it. What diseases or what types of outbreak should be looked at askance in deciding whether this simple and readily followed method is to be adhered to? Definitely all outbreaks which include moist surfaces, blisters, pustules, lacerations, or ulcerations are not properly amenable to such measures. Any beneficial effects of sunlight and air are neutralized by contact with extraneous substances and particularly by trauma from clothing and harsher influences. The face is the one exception which might be mentioned, for during the daytime an adult with sufficient will power



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FOILLE EFFECTIVELY TREATS 1st, 2nd AND 3rd DEGREE BURNS

The physical characteristics of Foille are such that it is adapted to the same treatment methods employed with bland ointments namely, open applications, normal gauze and pressure dressings.

Chemically, Foille contains certain "Plus Factors" which combine to

(a) consistently avoid sepsis
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Two Convenient Forms Now Available

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FOILLE OINTMENT—stable, petrolatum-vegetable oil base —6 pound, 1 pound jars.

Both Foille forms are adapted to pressure dressing technic.

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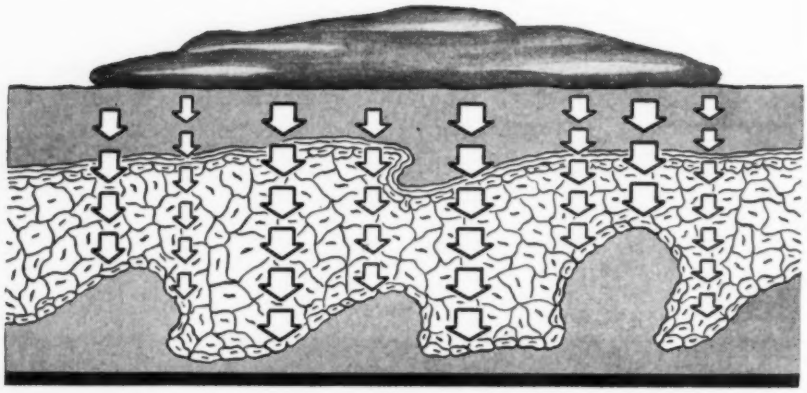

For prolonged, effective decongestion and analgesia in local inflammatory conditions, Numotizine's mode of action is outstanding.

By infiltration through the emplastrum and through the epidermal and dermal layers, the guaiacol, beechwood creosote and methyl salicylate are slowly absorbed, and thereby produce both local and systemic therapeutic effects. Numotizine exerts its effectiveness gradually and steadily over a period of eight hours or more.

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THE PRESCRIPTION CATAPLASM

Numotizine is clean and simple to use—it replaces the inconvenient, older methods of applying "ex-heat"—thus eliminating need for constant attention.

Indicated in chest conditions, sprains, neuralgias, strains, epididymitis, superficial abscesses, myalgia, neuritis and similar conditions.

4-oz., 8-oz., 15-oz. and 30-oz. jars

Ethically presented—not advertised to the laity

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and knowledge of the outbreak may steel himself to avoid contacting an oozing or blistered surface. Again, a bed-patient with cradle and proper attention may obtain the air part of the contract, even though the sun is seldom brought into the combination save through its artificial substitutes. The breaking of vesicles or opening of pustules at the time surgical dressings are changed permits proper attention and limits the flow of secretion by mopping up or absorbing the fluid at a convenient time. A lesion undergoing the sun and air cure may suddenly be called upon to withstand abrasion or smearing contamination by an unexpected contact. Not only may infection from other sources reach the exposed lesions but possible contagion from them readily spreads to other foci as an auto-inoculation or as transference to other individuals. If properly protected by suitable dressings, not only is the covered area better assured healing but other prospective sites are guarded thereby. Granting that the climatic influences mentioned do have a drying effect, is that the proper procedure in some of these serous or purulent conditions? To dry the surface speedily may involve imprisonment of secretion beneath a leathery coating or a thick crust. No better example can be cited than the ecthyma of children at the seashore in summer. Originating from insect bites for the most part and practically similar to impetigo, these crusted pustules drag out a lingering course although uniquely situated to receive any benefit to be derived from sun, air, and water. Another cross borne by the dermatologist is the disposition of the public to link skin outbreaks to the blood or to organs not definitely implicated. What more meaningless sayings exist than "you have blood trouble" (acne, furunculosis); "too much acid in your system" (eczema, psoriasis); "liver is out of order" (keratoses, chloasma)? Granting that some of the diseases mentioned are not clearly understood and that many doctors feel they should give a definite cause when pressed for one, the attempt should be made to raise the patient's outlook above terms that mean nothing and lead to false conceptions. In treatment he has already leaped from sulphur and molasses to sulfa drugs and vitamins. Let us try to be more explicit in etiology. Psoriasis can be explained as probably caused by metabolic defects; boils as follicular infections; chloasma as often due to endocrine dysfunction. The medical columnists have already put advanced ideas into the heads of the public, although even they also occasionally dip into old-fashioned concepts. Our patient was happier with his platitudes, as was the savage in his natural environment, but we cannot leave him there. We must carry him along with us to more rational viewpoints.

—E.F.C., editorially, in *Pennsylvania Med. J.*, October, 1944.

Pneumonia in Shipbuilders

THE recent tremendous addition to the number of welders engaged in essential war industries has brought into focus the possibility of an increase in respiratory diseases in such workers resulting from the character of their tasks. Symptoms of various sorts are attributed by these workers and by many physicians to the fumes to which they are exposed. The symptoms may simulate those of acute systemic or respiratory infections or those of chronic respiratory diseases. The former are encountered most frequently during the season when acute respiratory infections have the greatest incidence, which suggests an increased susceptibility of such workers to the prevalent infections. The latter are usually recognized in x-ray films of the chest taken routinely or because of respiratory symptoms. With respect to the lung changes in electric-arc welders, Sander has recently pointed out the importance of preventive measures for the protection of workers. He finds that electric-arc welding that is done in large rooms, or where the fumes are not allowed to concentrate excessively near the breathing level, does not cause lung changes even after many years of work. On the other hand, excessive inhalation of concentrated fumes, especially in confined and unventilated spaces, may cause siderosis. The siderosis so produced consists of the deposit of inert iron pigment in the lymphatics without fibrous-tissue proliferation and without progressive changes after the exposure

—*Continued on page 962.*

NOVEMBER 14, 1666...

DR. SAMUEL PEPYS, in his famous diary, wrote: "*Here Dr. Croone told me that at the meeting at Gresham College tonight, there was a pretty experiment of the blood of one dog let out, til he died, into the body of another on one side, while all his own run out on the other side. The first died upon the place, and the other very well and likely to do well. This did give occasion to many pretty wishes, as of the blood of a Quaker to be let into an Archbishop and such like; but, as Dr. Croone says, may if it takes, be of mighty use to man's health, for the amending of bad blood by borrowing from a better body.*"

DR. PEPYS' notation that transfusion "may if it takes, be of mighty use to man's health" was surely prophetic, for today it is of tremendous therapeutic importance.

But the difficulties of typing and cross-matching where immediate transfusion is necessary pointed to a need for an acceptable blood substitute. Blood plasma was the substitute of choice and now, because dried plasma is not only stable and portable, but also because refrigeration is unnecessary, it is being used more and more wherever plasma is needed.

In addition to supplying Army and Navy requirements for plasma, Sharp & Dohme offer 'LYOVAC' Normal Human Plasma for use in civilian medical practice, using blood from professional donors . . . a project that makes 'LYOVAC' Normal Human Plasma ready for instant use wherever it is needed. Each 250 cc. unit contains approximately as much osmotically active protein as 500 cc. of whole blood.

Sharp & Dohme, Philadelphia 1, Pa.

A development of Sharp & Dohme Research **'LYOVAC' NORMAL HUMAN PLASMA**

CURRENT ARTICLES of QUALITY

Dental Findings

LEON R. KRAMER, D.D.S., M.S.P.H., Director, Division of Dental Hygiene, Kansas State Board of Health, "Report of Dental Findings in an Industrial Hygiene Survey of the National Battery Company, Leavenworth, Kansas," in *J. Am. Dental Assoc.*, July 1, 1944. Text: "One hundred sixteen persons, the total number of employees of the National Battery Company, Leavenworth, Kansas, were given a dental examination, March 24, 1944. The object of the examination was to determine the general mouth health of the employees and to record conditions that might be contributed by their occupational contacts with lead in the industry. The inspection was made in an exceptionally well-lighted room. A head-lamp and wooden tongue depressors were used. Cases of special interest were examined with mouth mirror and explorer. The 116 employees were distributed in departments as follows: office, 14; janitor, 4; shipping, 22; assembly, 25; casting, 16; paste, 9; separators, packing, trimming, charging, painting, farm light, repair, maintenance, rejection, etc., 30. Forty-eight of the employees were women, 68 men. The length of employment ranged from one or two weeks to 18 years. Findings were recorded as follows: missing teeth, filled teeth, cavities unfilled, teeth needing extraction, prostheses, halo saturnis (purple gums) and gingival infection. As indicated on the chart recording findings, the mouth conditions of the office force were excellent and every one showed good dental care. No halo saturnis (lead line) was found in this group. All the janitors, who had been employed more than six months, showed halo saturnis with little evidence of dental care. There was little or no evidence of halo saturnis in those employed less than three years in the other departments of the factory. It was noted that practically all persons who had been employed for periods of more than three years presented evidence of purple coloring of carbon or hard tartar deposits on the teeth. Employees, several of whom had worked in the industry for many years, who daily brushed their teeth and had them cleaned at regular intervals presented little or no evidence of lead lines. Two persons, one female, the other male, presented typical halo saturnis from third molar to third molar in both upper and lower jaws. Both had subacute forms of advanced gingivitis. Neither one presented any evidence of oral care. Other cases were usually limited areas presenting tartar or showing advanced pyorrhea. The over-all picture of the mouth conditions of the employees indicated that a high percentage of these persons had procured a considerable amount of dental service, more in fact than would normally be expected. *Recommendations:* On the basis of the findings of this survey, the director of the Dental Division of the State Board of Health recommends the following procedures as a safeguard of the mouth health of employees of this and similar types of industry. (1) Reduce or control gingival and other infection by treatment, scaling or cleaning and extractions by the dentist. (2) Have the teeth cleaned by a dentist as often as necessary to prevent sustained gum irritation by calculus. (3) Brush the teeth properly, morning and evening. One part of table salt (finely granulated) and three parts of baking soda (mixed thoroughly) makes an effective tooth powder. (4) Have the condition of the teeth checked regularly by the dentist and have needed corrections made promptly."

Rehabilitation

DR. C. C. BURLINGAME, Hartford, Connecticut, "Mental Health vs. Money in Rehabilitation," in *Connecticut State Med. J.*, April, 1944 (8:207-213); as condensed in *Digest of Treatment*, October, 1944: "Rehabilitation must extend far beyond the short-sighted idea that if the government opens its purse-strings, all will be accomplished as desired. To make a man fit to earn his living again is the main part of any rehabilitation plan. The indiscriminate use of governmental largess might well double the toll of psychiatric casualties. There are many groups attempting to study the problem of rehabilitation, but so far we have not evoked a unified policy. I have some suggestions to make concerning rehabilitation which would extend beyond the mere expenditure of money,

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(1) Combes, F. C.: Indus. Med., July, 1944.
(2) Parkes, Morey: Indus. Med., January, 1944.

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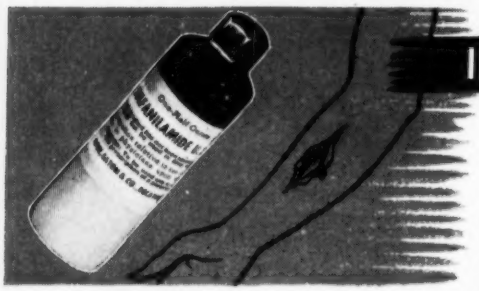

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toward a goal of mental health. Rehabilitation is the people's problem. If the people are to solve their own problems successfully, we must have a preliminary form of public education. When our youth entered this war, you and I wondered if they were not 'soft' and would not be able to 'take it.' Our soldiers turned out to be deadly serious soldiers. It was a matter of intensified orientation for war which made our boys at the fighting fronts the world's best killers. That is is the way we have mobilized for war. As we trained for war, so must we train for peace. We have been taught that peace is worth fighting for and worth dying for, and now we must be taught that it is worth working for. The first form of public education and rehabilitation must begin with a consideration of our attitudes toward the returning millions of our armed services. The number of men rejected or discharged for neuropsychiatric reasons will be very large, and our people must be educated to the fact that these men are not weaklings or malingers. A speedy and thorough reassimilation into civilian life is indispensable and sometimes the only thing necessary. A program of public education must be comprehensive enough to give help not only to the casualties who suffer physical disabilities, but those who have had their minds deranged and hopes destroyed, or their courage weakened. Without any claim to originality, I would suggest that the same machinery which helped to educate and indoctrinate our people to a state of war be put in reverse and be used to re-educate for peace rehabilitation. Such a program might encompass three main points: (1) The development of right attitudes of the public toward the returning casualties; (2) an indoctrination and re-education for peace objectives and rehabilitation; (3) a vision of our future. Our returning casualties must not be made to feel that they belong to a separate group. Pity may do more harm than neglect. We must have sympathy and we must have understanding. We must show an attitude of confidence in the returning man's ability to win the peacetime battle as well as he has won the battle overseas. The first step on the road to mental health for any living human being is the will-to-do. It is necessary to create a will-to-do, not only in the individual casualty, but on the part of our entire population. If we make cash compensations our chief demobilizing policy, we may create the very situation we are trying to avoid. Our assistance should foster all the social drives of the casualty. If we owe our men a debt in cash, let it be so administered that the man does not engage in a lifelong debate proving that he is incapacitated, totally or partially. Actually no amount of monetary reward can ever compensate any man who has really served his country in war. There are too many agencies working out plans for rehabilitation. These need to be centralized, and a definitely formulated national policy should be evolved with as little red-tape as possible. The will-to-do should be induced in the dischargee while he is still in the service and is about to make the first step toward civilian life. There must be a simplification in the subsequent steps of job placement. The selective service in reverse would probably act as the best agency because it operates at a community level. After we succeed in eliminating red-tape in the discharging of the man from the service, and after the problems of job placement are properly placed in the hands of the local boards, a practical program of social and industrial rehabilitation can be started. This portion of the program of rehabilitation is entirely the job of the people and is not for bureaucracy. Industry, labor representatives, working with leaders in the field of mental hygiene might cooperate in designing a reorientation program. The attainment of a vision of the future means rehabilitation

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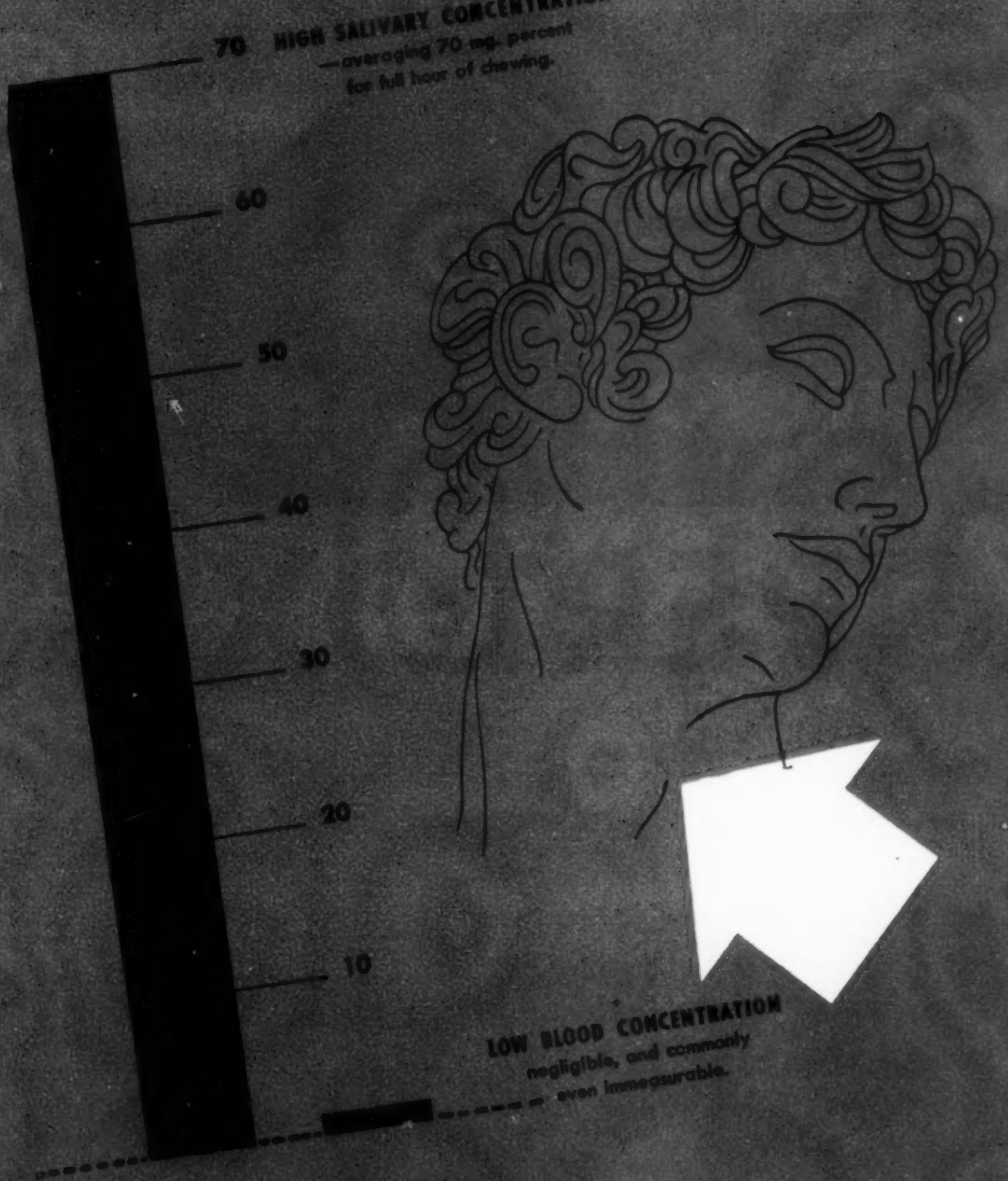
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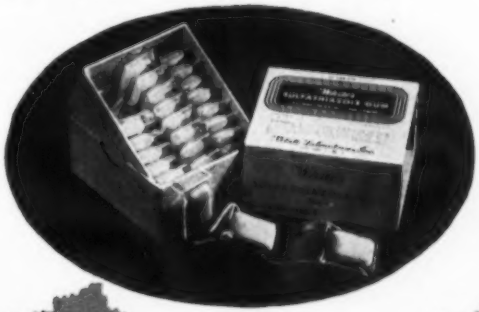

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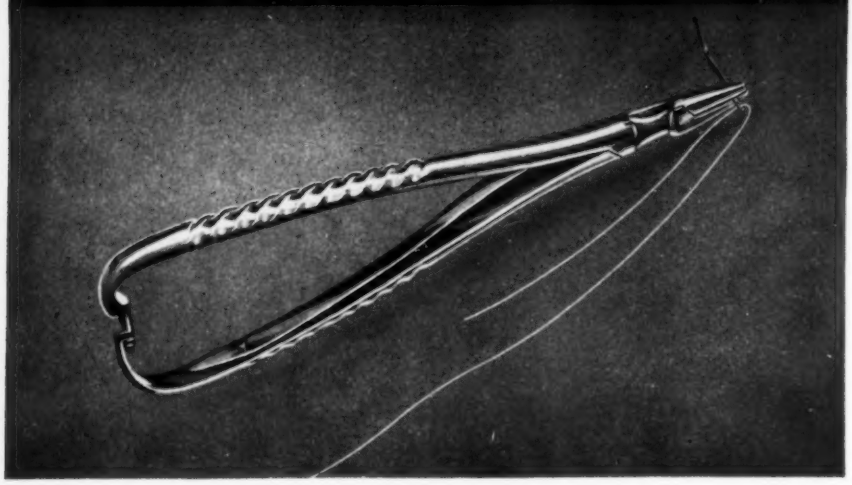

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through the development of hope and belief in the fruits of peace. Not only the attainment of the four freedoms is necessary in our vision of the future, but there must be an opportunity for every individual to satisfy his urge to create. Given the opportunity really to be a creating, growing individual, there will come national goals, national objectives, and a national vision of the future."

Industrial Nursing

INDUSTRIAL NURSING: ITS AIMS AND PRACTICE, by A. B. Dowson-Weisskopf, S.R.N. (Edward Arnold & Co., London, 1914) is thus reviewed, by D. S., in *British Journal of Industrial Medicine*, July, 1944: "In the rush and bustle of war new functions have frequently been fastened on to many categories of people without adequate time being given to precise definition of scope. In this country reliance is always placed upon empirical methods: we learn by experience and are suspicious of all-embracing definitions particularly in matters relating to human beings. However excellent may be the ultimate outcome of this approach, there is bound to be much muddle in the process of settling in and getting everybody to understand what has happened. In the field of industrial hygiene, health, and welfare there has been just such a process of muddle. Orders were issued by the Ministry of Labour that medical supervision must be introduced and it was left in large measure to industry to discover what medical supervision of workers meant. Certain it is that the great majority of doctors and nurses who were thus pitchforked into industry did not know what is meant and thus different interpretations emerged. Some of these interpretations, as manifested in actual practice, were frankly reprehensible, both in the manner in which some employers defined the work's doctor's functions and in the manner in which some doctors applied their art to industry. Members of the nursing profession were appointed into industry to provide health supervision or care of workers and were in many cases grossly exploited. Regularization of the position was made possible by the efforts of the British Medical Association and the Royal College of Nursing. These bodies made valiant attempts to define the scope of medical and nursing services in industry, to lay down ethical rules, scales of salaries, and to support or organize training courses for persons proposing to enter, or actually in, these services. The path to the full regularization of these services is uphill, for whereas the employer has some reason to consider the doctor or nurse appointed by him as subject to his jurisdiction, the work-people have a natural tendency to suspect a service which, whilst claiming to be established in their interests, has many aspects suggestive of an interested paternalism in which the doctors and nurses have the appearance of employer's men and women. There will be much heart-burning before a solution, satisfactory both to employers and workers, is found, particularly for the hosts of small concerns. In the little volume under review, the author takes up something of a fighting position. To her the nurse in industry, considered mainly as working on her own without the direction of a medical officer, is an independent person and can exercise her authority in an enormous field; and should she be dissatisfied with any aspect of her work it is her right to beard the chairman, the managing director, or anybody else, in his den and demand satisfaction. The author goes further in saying that the nurse should discuss with the Factory Inspector the desirable changes in the factory; and even further, in stating that the nurse should demand the dismissal of officials who, in her view, are having an adverse effect upon the workers' health or welfare. The state of mind of the author is illustrated by the following: 'Since industrial managements are lay bodies concerned with production and except in war-time, with marketing their goods, who may know very little about health services, it is unwise that they should entirely prescribe the limits of the nurse's work.' These limits must presumably be laid down by the nurse or by the nurse's organizations, and, says the author, it must be demonstrated to the employer by results that it pays. This is a pernicious doctrine. There is only a single criterion of the value of health and welfare service in a factory: it is that the service ministers, within its province, to the

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(1) Am. J. Obst. & Gyn., 35:839, 1938. (2) West. J. Surg., Obst. & Gyn., 51:150, 1943. (3) Clin. Med. & Surg., 46:327, 1939. (4) Med. Rec., 155:316, 1942.

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needs, physical and psychological, of the workers. That such services pay or do not pay is irrelevant and not the concern of nurses or doctors. It is interesting that the author, in giving an example of what an annual report by the nurse should comprise, starts the report with a section headed 'Workmen's Compensation,' in which actual figures of money paid are detailed. Is it intended that corresponding to the 'Compo Doctor' there shall now be a 'Compo Nurse'? Except to report on the purely medical aspects of injury or disease, as she sees them, the nurse in industry should have nothing whatever to do with matters in which a financial transaction arises between a worker and an employer. We must confess to a certain apprehension when we hear the views of certain leaders of the nursing profession which seem to favour the development of a nurse in industry with many of the characters of business personnel. Is it too Victorian to prefer the older conception of a nurse as a person dedicated to the service of mankind—with the proviso that it shall be the business of the state to prevent exploitation—and not involved at all in the selfish scramble of commerce? It is suggested that a nurse of this kind obtains the cooperative and understanding response from employers and professional managers, coupled with respectful deference and even homage, which are never obtained by the business-woman type. We would recommend the perusal of this little book rather as an index of topics calling for study by the industrial nurse than as a reliable textbook for practice. For the latter the nurse in the factory will have to look elsewhere."

Medicine and Dentistry

JOHN T. O'ROURKE, D.D.S., Dean, University of Louisville School of Dentistry, "The Common Areas of Medicine and Dentistry," in *Kentucky Med. J.*, October, 1944 (42:10, 311-315). Extract: "It is obvious that oral conditions of purely local origin lend themselves to direct service by the dentist and to surgical procedures which may involve the services of the oral or general surgeon. These are well known, and for that reason will not be discussed here. Oral conditions which are direct manifestations of systemic disease or disorder represent a somewhat new area of common ground for the physician and dentist. In fact they represent the most significant connecting link between the two fields. When it is recalled that all of the infectious diseases, all of the blood dyscrasias, most of the metabolic disorders, the avitaminoses, and many other conditions express themselves in some way and to varying degrees in the oral hard and soft tissues, it is not difficult to visualize the extent of medico-dental relationships which are involved. Unfortunately these relationships have, because of the supposedly spectacular nature of focal infections, received but little consideration. However, it is gratifying to note that they are now being given the recognition they deserve. Beginning with the period of growth and development, and extending through adult life, the influences of systemic conditions express themselves in the oral hard and soft tissues. In fact, their influence is so widespread that it is difficult to point to a significant number of oral conditions which are strictly local in origin. It cannot be said that dental caries arises entirely from local causes, for were that true, more would have been accomplished in reducing its prevalence. It is now well known that diseases of the supporting tissues which, next to dental caries, represent the most widespread dental diseases, are, as far as their etiology is concerned, only in part associated with local influences. Successful treatment of these conditions cannot in a great many cases be accomplished without taking into consideration their probable relations to a large number of conditions. These may include changes associated with low ascorbic acid levels, diabetes, the anemias, leukemia, influenza, ageing, and a long list of systemic conditions which need not be mentioned here. Many of these systemic conditions manifest themselves as gingivitis or stomatitis, and unfortunately they are assumed by many to be simple Vincent's infections and treated as such. It is not uncommon to see oral symptoms of blood dyscrasias, and other conditions treated unsuccessfully for weeks with topical applications of drugs, and the home use of mouth washes, without any attempt to find or treat the basic factors involved. Evidently too many have proceeded

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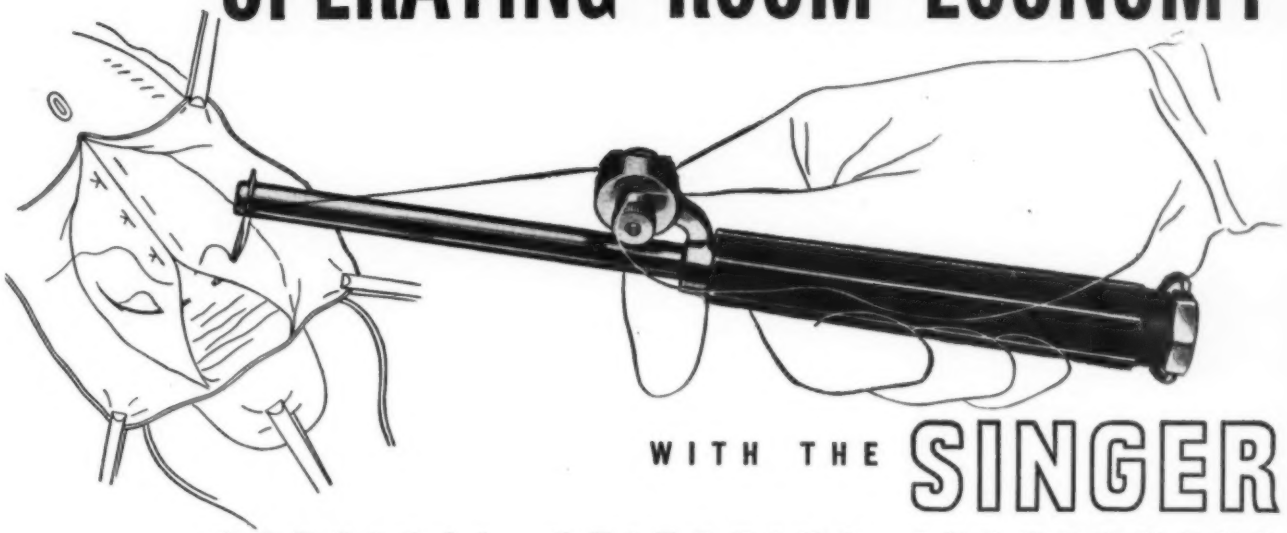

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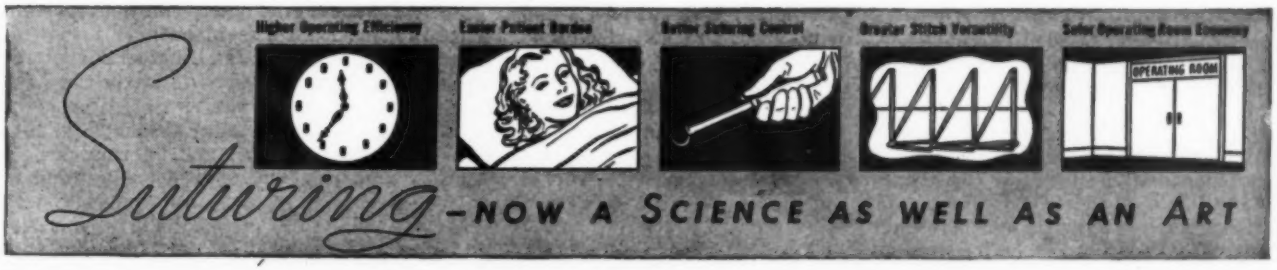

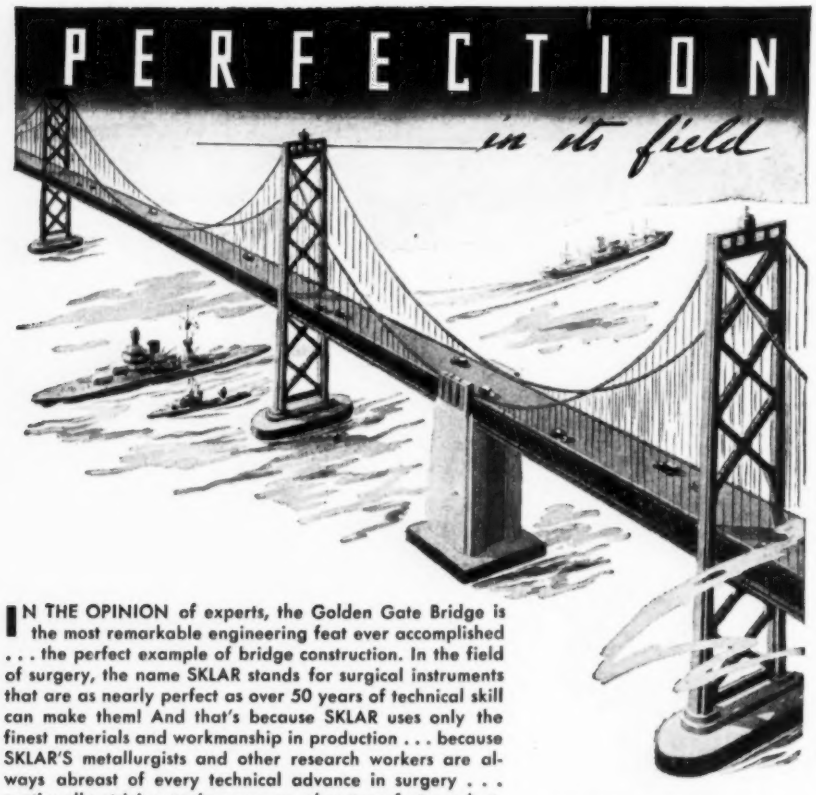

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on the assumption that 'Vincent's infection' can be labelled as a distinct and separate condition, rather than one which in most cases, should point to primary local irritants, or to one of a large number of systemic conditions which set the stage for invasion of the oral tissues by the fusiform and spirochete. Too frequently it is a case of treating the symptoms rather than the cause or causes. (Acute severe symptoms as against subclinical changes.) As previously stated, the oral symptoms of systemic diseases or disorders may be fused with those which arise from local causes, such as mouth filth; deficiency in the number of teeth, faulty dental restorations, habits of occlusion and the like. In such cases the problem of treatment on the part of the dentist becomes extremely difficult. He then needs the cooperation of the family physician if he is to be successful in his efforts. In these cases the individual seeks the services of the dentist for the conservation of his teeth. If the dentist in turn locates some systemic influences on the oral tissues, and refers the patient to his physician, he is expanding his service, and his treatment is more enduring if the patient is cared for by the physician to whom the case is referred. For this reason it is hoped that the cooperation of physicians and dentists will increase, and keep pace with modern trends. Both physicians and dentists will be pleased to learn that a broad approach to diagnosis is now emphasized in most dental schools, and that the basic sciences and general medicine are becoming a more significant part of clinical dentistry. At the same time, medical students are becoming more familiar with oral pathology and diagnosis. This will mean much in the future, and it is mentioned here because it indicates a trend which has much to commend it, and one which will doubtless grow in force during the next few years."

Industrial Dermatitis

DR. LOUIS TULIPAN, Clinical Professor of Dermatology and Syphilology, New York University College of Medicine, "Industrial Dermatitis," in *Connecticut State Med. J.*, October, 1944 (8:10, 674-677). Extract: "Interpretation of patch tests must take into account possibilities of 'delayed,' 'false negative,' and 'false positive' reactions. An underlying vasomotor irritability may produce erythema due to pressure and friction (as is seen with dermographism produced by stroking) or prominence of follicles, resembling 'goose skin' due to pilomotor irritability. This often gives a 'false positive' reaction. At best, patch tests can only serve to correlate clinical findings and to guide one in reaching conclusions; they are not to be regarded as the basis of a diagnosis. At all times there should be a careful evaluation and impartial opinion as to causal relationship. In the treatment of industrial diseases of the skin, we can start by considering those cases where the causative agent is known and advise elimination of further contact with that agent. This can be done by providing the employee with protective clothing or removing him from that particular work. Personal cleanliness and cleanliness of the factory are first on the list of prophylactic measures against industrial skin diseases. There should be clean floors and walls, clean machines (glass enclosed if possible), exhaust hoods over machines which spray oil or fumes, air conditioning, and air cooling in the summer. Daily change to clean underclothing and showers after a day's work should be added. I should like to say here, that I feel that the subject of industrial dermatoses has been sadly neglected. I place the blame for this neglect upon the colleges that are lax in teaching this subject, and upon the insurance carriers whose engineers could enforce the various protective measure on concerns or else refuse them insurance coverage. It is my opinion that the state labor commissions are at fault in not hiring dermatologists. In addition, the carriers have neglected a special feature in relation to this subject by not following in the footsteps of chemical houses which create specific funds for the study of scientific subjects to their interest. I believe the carriers should establish such funds in colleges to permit dermatologists and industrial physicians and surgeons to study the various phases of industrial diseases. I also suggest that industries hire young, well-trained dermatologists who have had a good background in general medicine, for in that way they could prevent the occurrence of many prolonged and chronic eruptions due to improper methods of treatment."

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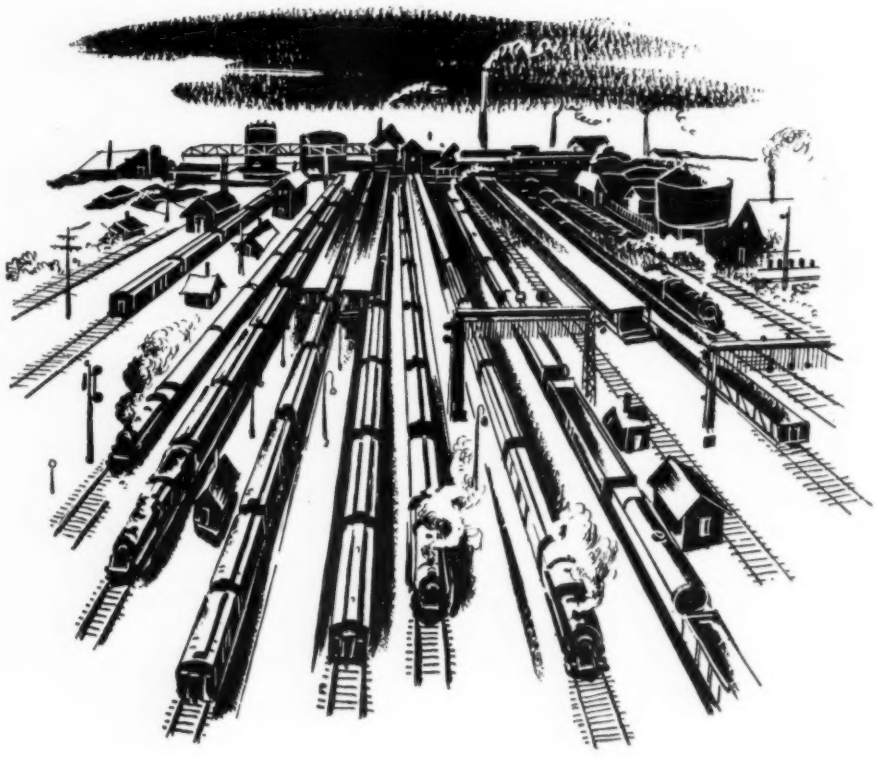

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